Engagement of Learners Undertaking Massive Open Online Courses and the Impact of Design

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Abstract

This thesis investigates the low levels of student engagement after registering to study for a massive open online course. To do this, it adopts a mixed methods approach (Gray, 2013) by analysing two large-scale surveys (120,842 and 1,800 responses respectively) and interviewing 12 learners. This was possible because access was given to 76 presentations of 19 MOOCs produced by The Open University on the FutureLearn platform. The aim of this thesis was to answer two research questions. Why do learners engage in massive open online courses (MOOCs), and what elements of the design of MOOCS encourage learner engagement?

The analysis of 120,842 survey responses illustrated that learners across all the MOOCs investigated in this study were very focussed on personal interest, regardless of subject. Courses with subject material which focussed upon the future use of technology and educational technology were embarked upon for professional purposes secondary to personal interest. Learners interviewed who had not completed the MOOCs did not see themselves as disengaged but as having achieved their study goals.

Learning designs of 19 MOOCs with learner activity and dashboard data from 800,038 enrolments and 425,792 learners were analysed with respect to the second research question. The activity data from 425,792 learners demonstrated they were more likely to engage with comments and to like comments on steps such as articles and videos than on discussion steps. Findings from the performance dashboard data (for example enrolment numbers) and learner activity data, coupled with learning designs, were analysed. From this, high-engagement steps ('Super Steps') were identified and isolated for analysis. This study discovered that learners preferred to engage with steps that the learning design framework classified as communicative or assimilative. Learners were more likely to engage with steps that posed questions within their titles, a previously unconsidered element within learning design.

Hannah Gore

Acknowledgements

This thesis is dedicated to my late father who taught me that I could achieve anything, and to my dog who has impatiently waited for me to finish.

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Chapter 1: Introduction

1.1 Background

This thesis investigates why learners engage in massive open online courses (MOOCs) and which elements of learning design support that engagement. It identifies the elements of these courses with which learners are most likely to engage. Its findings have implications for the learning designs of MOOCs moving forward.

In the last five years MOOCs have gained significant attention since widespread interest in them has developed in both academia and the media. Initially MOOCs were delivered online without commercial focus, but since the launch of Coursera in 2012 MOOCs are now more aligned with for-profit and act as a method of student recruitment to formal university qualifications.

In December 2012 The Open University launched its own MOOC platform called FutureLearn in conjunction with 12 founding partners, namely The Open University, University of Birmingham, University of Bristol, Cardiff University, University of East Anglia, University of Exeter, King's College London, Lancaster University, University of Leeds, University of Southampton, St Andrews University, and University of Warwick. FutureLearn was created to provide UK platform representation in a US dominated market. In 2013 The Open University (OU) launched its first MOOC, Introduction to Ecosystems, on its own platform, FutureLearn.

Since 2013 the OU has continued to develop further MOOCs for FutureLearn across a spectrum of subjects. Research within the OU as a result has grown and, given the commercial focus of MOOCs on turning learners into students, an emphasis has been placed on learner engagement. The OU refers to this journey to attract and convert for-free learners into for-fee students as 'Journeys from Informal to Formal Learning' (JIFL). For such a conversion to take place the OU expects that a learner will progress through sections of a MOOC or MOOCs, giving them the necessary confidence and exposure to enough course material to encourage them to take their learning further and explore

more formal, for-credit options. Without optimum levels of engagement with the materials it is perceived by the OU that a learner may lose interest in the course and possibly the prospect of becoming a formal student, therefore causing a potential fall or lack of increase in recruitment of students.

1.1.1 Role of MOOCs in Professional Practice

This research has relevance to my own practice, having joined the OU in 2005 and in that time developed a range of projects with students and academics, largely based on the theme of improving online communication methods within the web presence of the OU, utilising a range of emerging tools, platforms and techniques to leverage student engagement. For the last eight years I have been working on several projects on the impact of social media on student engagement, with the developing movement towards social learning and its use of hosting on third party platforms. My portfolio subsequently expanded and now fill (at the time of writing) the role of Senior Producer: MOOCs at The Open University. It is this role, and the culmination of much experience across the domain, which has led me to influence and lead the development of features and content of the OU's free online learning platform, OpenLearn, and to produce and syndicate content for the MOOC platform FutureLearn.

1.2 The Problem the Study is to Address

In the early years of MOOCs the drop-off rate from learners that registered for a MOOC to those that completed a MOOC was on average 90 percent (Jordan, 2015). Whilst MOOCs fulfil an element of the OU's 'social mission' to provide free learning as set by its *Royal Charter*, the OU MOOCs are also used as a recruitment tool for formal for-fee education. With this in mind the University must create interesting materials to act as a 'shop window' to entice learners into becoming students. If the learners do not find the material to be interesting, a supposition could be made that the formal for-fee material is not of interest either, thus deterring learners from becoming students. The problem relating to engagement of learners with learning design is one that is experienced across all MOOCs

regardless of platform. Though this research focusses on OU MOOCs on the FutureLearn platform, the findings are of relevance in the wider field.

The study will address why learners register on OU MOOCs and which elements within the learning design of OU MOOCs learners find most engaging, the purpose of which is to identify how to develop learning designs of OU MOOCs moving forward.

1.3 Context of the Study

The main areas of study that this research will address are:

- The reasons why learners are attracted to OU MOOCs on FutureLearn
- The application of learning design within OU MOOCs produced for FutureLearn
- The identification of the elements of learning design that learners engage with most within OU MOOCs presented on FutureLearn

As the OU is a provider of courses to the FutureLearn platform, the research will specifically focus on a range of MOOCs produced for this purpose. Though the context of these MOOCs is platform specific, the findings are transferrable to MOOCs produced for alternative platforms and by alternative providers.

1.4 Framework of the Thesis

This first chapter provides an introduction to the context of the problem, the rationale of the research including contributions to the field, definitions of key terms used within the thesis, and the research questions being addressed.

The second chapter provides a review of the literature within this field, focussing primarily on theories and publications concerning MOOCs, the concept and use of the term ‘learners’ within the literature, and engagement and learning design. Gaps highlighted in this review resulted in the

formation of the research questions this thesis is based upon, while gaps were also identified in the definition of the term 'engagement' and how it is perceived in the literature.

Chapter 3 introduces the methodology adopted for this thesis and provides the narrative to the different phases of the studies, from the Initial Study to the Main Study. The Initial Study was conducted from a series of telephone interviews from which a learning design engagement survey was generated for use in addressing the second research question. The first research question is addressed in Section 3.4.1 through the analysis of a specific question within a beginning-of-course survey. Section 3.4.2 provides the methodology used to address the second research question through the analysis of performance dashboard data and the learning design engagement survey derived from the Initial Study.

In Chapter 4 each of the 19 MOOCs selected for research are reviewed in terms of their learning design and performance data. From this each of the research questions are addressed in turn. Key findings are highlighted in terms of each of the research questions before proceeding to a discussion of all findings from the analysis. The findings presented allow the questions and aims of the thesis to be addressed.

This thesis concludes with Chapter 5 where all the findings are brought together to consider the contributions this research has made. Any limitations of the study and possible implications for future research are also reviewed.

1.5 Original Theoretical and Practical Contributions to the Field

Though much literature has been published on a range of academic enquiries associated with MOOCs, there is still a large gap with regards to the connection of learning design to learner engagement, especially regarding a sample of MOOCs of the size found in this thesis, from the same institution. The revenue-generation potential that is inherently interlinked with the presentation and completion of MOOCs through associated certification purchases means that data from MOOCs is

not usually available in the public domain as it is deemed commercially sensitive. As a result of these restrictions, large-scale longitudinal studies of a range of MOOCs, especially those produced by the same university over a period of years, are not commonplace, with only limited small-scale examples available (Ho et al., 2015).

From 1 August 2013 to 1 January 2017, the OU produced 48 MOOCs for the FutureLearn platform, totalling 119 presentations. This study has selected and analysed the 19 MOOCs produced during the 2014/15 academic year (August 2014 to July 2015) which have presented 76 times in total from August 2014 to January 2017. The learning design process of these MOOCs was led by the Institute of Educational Technology (IET) on the OU campus. This ensured that each of the MOOCs was designed using the same principles as those of the modules within the OU's formal curriculum. An academic review of a consistent structured approach to producing a large number of MOOCs using one learning design taxonomy by the same university, available for academic comparison, will be an original theoretical and practical contribution to the field. Theoretical and practical contributions achieved are through defining what factors (variables, concepts and constructs) need to be considered during learning design to develop a logic to assist in the development of an engaging MOOC (theoretical) and how the findings from the research can aid MOOC creators in developing more engaging MOOCs moving forward (practical).

As the MOOCs being researched all use the same learning design taxonomy and the same beginning-of-course survey, cross-referencing and comparisons can be made in determining what factors lead learners to engage with MOOCs and which elements of learning design they engage with the most. Whilst understanding why learners engaging with MOOCs is not a new concept, the extent to which this research seeks understanding of the reasons for this is new. As previous large-scale studies of MOOCs involved a number of MOOC providers (Adamopoulos, 2013; Hew, 2014; Reich, 2014; Alraimi et al., 2015), although they provide valid insight, they are absent of the consistency that one single approach can provide at a scale larger than most collective reviews to date.

In terms of practical contribution, for both research questions the MOOCs reviewed within this thesis were systematically analysed to produce findings overall, by subject and by individual MOOC. This level of detail is beneficial to MOOC creators in applying top-level knowledge, subject-based specific knowledge and the granular detailed knowledge of individual MOOCs. The volume and range of the MOOCs identified for this research mean that the findings are reliably supported by data from multiple presentations upon which practical conclusions can be based

1.6 Definition of Terms

A number of key terms are used throughout this thesis. The first, and one critical to the underpinning of the research and findings, is 'engagement'. Definitions are also given to the terms 'learner', 'learning design' and 'MOOCs'. It is these definitions that are referred to throughout this thesis.

1.6.1 Engagement

In reviewing academic papers relating to engagement, very few had an actual definition of the term within them (Cormier and Siemens, 2010), and none addressed the context of learning of MOOCs, with most relating to the traditional classroom setting (Becker, 2000; Kuh, 2001; Kuh and Gonyea, 2003; Ahn et al., 2013; Milligan et al., 2013; Ramesh et al., 2013).

Fredricks et al. (2004) state that engagement was a 'meta-construct' of complex and multifaceted components that incorporate diverse academic studies to provide an explanation of student success (see Section 2.4). Kahu (2013), in her paper on framing student engagement, explores behavioural dimensions of engagement, incorporating digital observations, online time to task, effort and participation, which are all relevant to the study of MOOCs, whilst also demonstrating the complexities of the multidimensional concept of engagement and how institutions can affect it. Coates (2007) provides a four-way typology of engagement of intense, collaborative, independent and passive, and makes a heavy causal link between social and academic engagement. Finn et al. (2003) state that social engagement is the foundation of academic engagement, and this will be

reviewed within the analysis of step engagement and the identification of 'Super Steps' (see Section 4.3.4).

Though there has been an interest in completion of MOOCs (Jordan, 2014; Reich, 2014; Jordan, 2015), there are researchers that question the significance of completion in terms of engagement (Haggard, 2013; Kizilcec et al., 2013; Wang and Baker, 2014). Therefore, engagement, though it may lead to completion, is a more granular concept. At present there is no definition for the term 'engagement' within a learning design context, and this distinction is required for the purposes of this research. Previous studies were drawn upon (Kizilcec et al., 2013, Ferguson and Clow, 2015, and Ferguson and Clow, 2016) to define engagement in terms of the proxies for learning.

For the purpose of this thesis, engagement is measured as interacting and accessing one or more steps within a MOOC at any time from course start date to two weeks after the course has officially ended. Learners may display either high or low levels of engagement within the course, with 'complete engagement' defined as completing the activities required by the platform to award certification. The proxies of engagement used within this thesis are: visiting steps, posting comments, and liking comments previously posted by other learners.

1.6.2 Learner

Learners are associated with for-free, not-for-credit, intentional learning, drawing on the definitions by Tough (1971) and Mocker and Spear (1982), whereby the effort is persistent but informal and voluntary. Students, within this context, are associated with for-fee, for-credit study, whereby the learning has a stronger focus towards achieving an academic status. Though this aforementioned terminology used within the body of the research, the responses given by the learners in interviews in the Initial Study included referral to themselves as 'students' and their learning as 'study' as they are more used to these terms from previous exposure to formal education.

1.6.3 Learning Design

One of the key themes of this research is learning design. MOOCs are subject to wider discussion in public social-media platforms as part of the learning design of the courses. For example, a MOOC may curate discussion through the use of a hashtag, therefore exposing the course highlights and pitfalls within the online public domain. A number of MOOC platforms also provide the first few steps of a course for viewing prior to registration, resulting in the learning design of MOOCs being open to indexes, searches and review.

In defining 'learning design', reference to the work developed by Conole (Conole et al., 2007; Conole, 2008a and 2008b; Conole et al., 2008c; Conole et al., 2008d) was reviewed to understand the purpose of learning design within an institutional setting and the development of the learning design toolbox. This research is built upon the work by Beetham and Sharpe (2007) which indicates that learners are technologically immersed and therefore see technologies as essential in learning in order to combine learning design with technology-enhanced learning. For the purpose of this study the principles of learning design are defined as the development of a range of activities associated with an overarching learning activity or course that leads to the development and successful achievement of pre-determined outcomes (Conole and Weller, 2008).

1.6.4 MOOC

Though the term widely used to denote massive open online courses is 'MOOCs', there are a variety of different MOOCs available. The original MOOCs are courses that are based on the fundamentals of constructivism (Siemens and Downes, 2008), whilst initial MOOCs on Coursera and edX were based on a behaviourist pedagogical approach with emphasis on personal rather than peer-to-peer learning (Conole, 2014).

The entirety of this research is dedicated to the OU's MOOCs produced for the FutureLearn platform. The OU MOOCs that have been selected for this research, although linked to

commercialization (through the optional purchase of a certificate upon completion), are free online courses to register and engage with.

1.7 Research Questions

From a review of the literature and the analysis of gaps within it, the research questions addressed in this thesis are:

1. *Why do learners engage in massive open online courses (MOOCs)?*
2. *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

Answering these research questions should address the gaps highlighted within the literature. The analysis of beginning-of-course survey responses from MOOC learners will answer the first question. The second research question will be answered through the analysis of the learning designs and performance dashboards associated with the MOOCs selected for this study. An additional learning design engagement survey focussing on elements of learning design will also be analysed. Since each of the MOOCs has undergone a number of presentations on the FutureLearn platform it is possible to review dashboard data and CSV exports (statistical reports) of learner activity data to ascertain how the learning design has had an impact on engagement.

1.8 Hypothesis for Definition of Engagement

From the literature review and the Initial Study, a definition hypothesis was formed from the highlighted gaps. Within this study it is theorised that levels of engagement within MOOCs are affected by four key areas: platform, population, presentation and pedagogy. Each one of these key areas can impact learner engagement; however, a positive combination of all four key areas could theoretically produce optimum engagement with course content. At present there is no published literature reviewing the combination of these four elements, so this would be a new contribution.

The four key areas are:

- Platform – the website on which the learners enrol and the MOOC is presented
- Population – the demographic of learners that enrol on the MOOC
- Presentation – when the MOOC presents
- Pedagogy – the MOOC itself, including the course's learning design.

This model is better defined in the following figure:

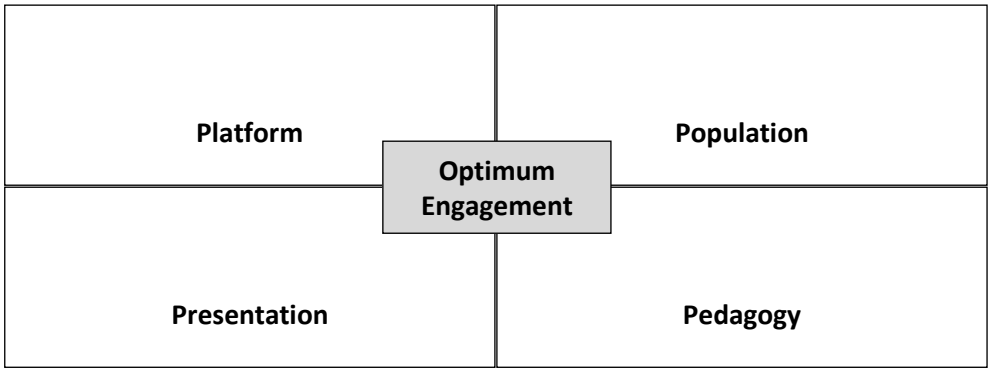

Figure 1: The Four P's of MOOC Engagement

The definition hypothesis is that all four P's should be at optimum levels to create optimum engagement, otherwise a decline in engagement will be caused. For example, if the presentation was at an optimum level (e.g. a nutrition course presenting to coincide with New Year's resolutions on diet, or a preparation course presenting before a formal module), there could be a high number of enrolments. However, if the pedagogy and platform were poorly designed and had attracted the wrong population (learner demographic) then engagement would be poor. If the platform was optimum but the remaining key areas were inadequate then the learners would like the platform but have no reason to engage. For the purpose of this study the focus of the research is on pedagogy (including learning design) of the courses produced by the OU.

As the timing of the presentation, the features of the platform and the learner population studying the course change with each presentation (as defined by FutureLearn), only the pedagogy of the course (as defined by the OU) remains the same and, therefore, for the purposes of this research, is

considered to be the stable aspect. If levels of engagement are researched in each of these four key areas and adjusted accordingly then optimum engagement can be achieved. However, for the research defined for this thesis only the elements affecting engagement within the learning design are reviewed.

This research reviewed all the presentations within the timeframe selected, not just the initial launch presentation, to give an indication as to whether the engagement was due to the pedagogy itself or to changes within the remaining three P's outside of the research. For example, were learners engaged due to a marketing campaign, an item in the news or a national event? The review of all presentations ensures that the response to the research question is as reliable as possible.

Therefore, for the purpose of this research, to identify learning design of interest to the learner, it is hypothesised that the definition of engagement is for the learners to engage with the content to the point that their interest has been fulfilled, which may not be in alignment with the need to complete the MOOC in its entirety. However, this granular definition of engagement is required for addressing, within the learning design, the learners who intend to finish the course thus reducing the engagement gap between learners with the intention to complete and learners that actually complete.

1.9 Scope and Delimitation of the Study

For the purpose of this research the MOOCs created and produced within the academic year of 2014/15 presented until January 2017 were studied. This particular timeframe was selected due to the stabilisation of the FutureLearn platform post-launch (November 2013), and because, uniquely (given the large number of MOOCs produced in 2014/15), the design creation, production and presentation of the 19 MOOCs under review were conducted by the same team. Having stabilisation in both technical and human resources allowed for consistency in the learning design of each of the MOOCs. Within the literature the MOOCs selected for comparison to this scale are produced by different teams within a number of universities, thus preventing a consistency in approach (Bali,

2014; Hew and Cheung, 2014; Jordan, 2014; Jordan, 2015; Margaryan et al., 2015). This is a consideration for this study as consistency in approach in learning design across a large number of MOOCs by a single institution will aid in reliably answering the research questions.

Within this study, though, the scope includes the 19 MOOCs created by the OU, and the limitation of the study is the review of the presentation of the aforementioned MOOCs solely on the FutureLearn platform.

Chapter 2: Literature Review

This chapter reviews the literature on open educational resources (OERs), MOOCs, informal and non-formal learners, engagement of learners, and the learning design of MOOCs. The purpose of this review is to identify gaps in the research on MOOCs in conjunction with learner engagement. Section 2.1 begins by outlining the history of Open Educational Resources (OERs), from which MOOCs emerged. Section 2.6 considers the gaps within the literature reviewed and how this study could address research questions derived from the gap identified. The review regarding engagement was extensive largely due to the absence of the definition of engagement with learning design within the literature. The chapter concludes with the overarching aim of this study and the research questions within.

2.1 Open Educational Resources

In the development of MOOCs, the emergence of the open content collectively known as OERs that led to the advancement of MOOCs must be understood. The creation of such OERs became parallel to the development of open licences and software, such as Creative Commons, Open Source Initiative and Open Source Software. Each of these initiatives are different in the content that they host but their principle ideas for open education remain the same (Pantò and Comas-Quinn, 2013): to host content that can be accessed freely. By allowing the ideals of openness and sharing (Wiley, 2009; Daniel and Uvalić-Trumbić, 2012), content could be built on the five R's: retain, reuse, revise, remix and redistribute (Wiley, 2014). Content can be open without the application of the five R's but Wiley (2014) argues it can be enhanced through the use of the five R's. As the concept of open education became more widespread, a number of projects and initiatives developed over the years (Bayne et al., 2015). These included Internet Archive, Connexions, the William and Flora Hewlett Foundation, MIT OpenCourseWare, WikiEducator and OpenLearn, to name but a few (Weller, 2014).

The distinction between MOOCs and OERs has been queried: if an OER or a collection of OERs is organised into a course structure, is it still an OER or is it a MOOC? Similarly, if a MOOC is made available after course presentation has concluded, does it become an OER? (Weller, 2014). Due to the commercialisation of MOOCs and the requirement for registration to access content from behind a firewall, 'MOOC' seems to be a misnomer (Wiley, 2012) in that, although the content may utilise the five R's of OERs to create a course, the course itself is not open. Also, the sustainability of OERs has been called into question by Weller (2013), with Downes (2006) citing a range of possible options for models to ensure the longevity of open education: membership, endowment, conversion, donations, contributor-pay, institutional, sponsorship, governmental, and partnerships and exchanges. Longevity in MOOCs is relevant in terms of commercialisation opportunities, but also in terms of creating engaging learning design to ensure sustainability both pedagogically and financially.

The models primarily used by the OU are endowment, conversion, sponsorship, institutional, governmental, and partnerships and exchanges. The use of such models has allowed for the development of OpenLearn, OpenLearnWorks and SocialLearn (see Appendix Eight), which led to the foundation of the partnership model for FutureLearn. This model has expanded to include the hosting of its MOOC content through its channels on third party platforms such as iTunes U, YouTube, Google Play, Audioboom, Bibblio, Faculti and Amazon. These models are applied due to the commercial links between the creation of open content and the possibility of attracting potential students for formal registration onto modules and qualifications.

The OU produces and releases OERs through the social mission outlined in its *Royal Charter* and hosts in excess of 1,000 open online courses including MOOCs. These models and platforms are relevant to this study as content hosted on these channels is utilised in the MOOCs created by the University. In leveraging the five R's of OERs to create MOOCs, the University is building on its

knowledge to create courses to engage a new audience of learners on FutureLearn. If the learning design of these MOOCs is not engaging then the model for hosting MOOCs is no longer sustainable.

The next section of this chapter reviews the literature regarding MOOCs and their emergence from OERs in more detail.

2.2 Massive Open Online Courses

The history of MOOCs is one of rapid development in a short timeframe, which is still progressing (Gore, 2014; Pike and Gore, forthcoming). In 2008, Siemens and Downes (2011) launched Connectivism and Connective Knowledge/2008 (CCK8), a for-credit course at the University of Manitoba, Canada. The course pushed the boundaries of connectivism ('knowledge distributed across a network of connections' (Downes, 2007)) with a larger learner cohort, with Downes and Siemens (2011) utilising a range of platforms from blogs, forums and wikis to Facebook groups. With over 2,200 registrations, learners were able to be part of a large and organic but interconnected learner community, whilst independently maintaining their own personal learning environments (Siemens, 2013).

In response to this event, Dave Cormier of the University of Prince Edward Island coined the term 'MOOC' (Cormier, 2008) whilst in discussion with Siemens and Downes, defining a MOOC as:

- Massive – as registration is not capped (with enrolment of some courses exceeding 400,000 students)
- Open – to take advantage of widely available OERs and open registration (though some MOOCs have prerequisites and for-fee registrations, examinations or certificate costs associated)
- Online – with no requirement for face-to-face attendance
- Course – the concept of a pedagogically designed learning journey.

However, this definition was created for the MOOCs being presented at the time, notably cMOOCs, which were the foundations to the MOOCs that we see today, with cMOOCs built on the principles of networking and connectivism (Daniel, 2012a). Later the MOOCs that were developed for large-scale host platforms such as Coursera and edX were based on the more classic information transmission found within a classroom environment, but online (Hill, 2013). Due to this evolution MOOCs do not necessarily fall within the definition created by Cormier as registrations can be capped within closed cohorts and the courses are presented on a platform with content behind a registration firewall. In 2010, Cormier and colleagues revised the definition of a MOOC to be an integration of connective social networking, facilitation of an acknowledged expert, and a collection of freely accessible resources (McAuley et al., 2010).

What is apparent is that MOOCs are a 'disruptive innovation' (Christensen et al., 2011) in education whereby a new market and value have been created that have disrupted the existing market and value of higher education. The British Council's course Understanding IELTS: Techniques for English Language Test enrols over 440,000 learners, making it the largest MOOC at time of writing (Parr, 2015). Whilst the volume of registrations is of interest, a further disruption is that the British Council is not a university provider. Where MOOCs have also created a disruption is in learning design, which is relevant to how learning design may be conducted in future. The initial MOOCs created for Coursera and edX were based on the transference of classroom/lecture hall content into the online domain, which led to low learner engagement (Parr, 2013) whereby academics have been disrupted in reviewing and developing teaching approaches (DiSalvio, 2012; Conole, 2013; Kolowich, 2013).

The appeal of MOOCs is a global one, with no time boundaries, as there are perpetual or repeated cycle presentations. There are no educational or professional prerequisites, although some MOOCs state that a certain pre-entry level of knowledge is beneficial. Some MOOC platforms set an age limit for registration, though this is not heavily moderated as all that is required with some platforms is an email address for enrolment (Pike and Gore, forthcoming). This creates a number of issues with

engagement, unlike in formal for-credit study which is more selective in presentation timings and prerequisites that can lead to an impact on student engagement. Not restricting entry to MOOCs leads to an engagement decline in comparison to formal study (Daniel, 2012b; Lewin, 2012; Meyer, 2012; Simpson, 2013). Though the platforms and courses themselves are accepting of all nationalities, export control regulations mean that United States platforms cannot be accessed in Syria, Cuba, Iran and the Sudan (Coursera, 2014). This is also reflected in FutureLearn with access removed for those in Cuba, Iran, North Korea, Syria and Crimea (FutureLearn, 2017). The removal of access can call the 'open' aspect of MOOCs into question. Though the majority of courses themselves are free to enrol on (though subscription models are emerging (Coursera, 2016), certification or proctored examinations are often optional for-fee activities. The only requirement is that the learner has access to the internet to engage with the course. In many cases it is not just those with no access to higher education who are capitalising on the phenomenon; research has suggested that middle class families are engaging in learning through MOOCs as a method to offset the high costs of education (Thrift, 2013), thus motivations to engage evolve.

Numerous demographic studies indicate that the majority of MOOC learners have a degree or higher (Balch, 2013; Belanger and Thornton, 2013; Breslow et al., 2013; Hill, 2013; Tomkin and Charlevoix, 2014). The findings from these studies suggest that:

- MOOC learners are most likely to already be enrolled in university education courses or have completed higher-level academic study at some point and are therefore not the demographic sought for the purpose of this study to encourage learners onto a JIFL.
- The engagement and drop-off rates are consistent across the MOOCs researched.
- Many MOOC learners already have a professional affiliation to their chosen subject area prior to registering.

None of these studies defined engagement, though they defined the measurements of engagement with which to make assessments. These findings also indicate that the demographic undertaking

MOOC learning is different to that of students who undertake formal study. Therefore, findings may impact on how and why a learner chooses to engage and for how long.

Opening the approach to learning and access to educational materials through MOOCs allows change in how content is learnt (McAndrew, 2010) by developing learning designs beyond traditional methods. It may also lead to a change in how learners choose to engage with the content. The rapid development and range of MOOCs has been a very public demonstration of this, through the uptake by universities to develop them and the number of learners enrolling on them. The first MOOC courses started to be delivered in 2008, but the breakthrough moment for MOOCs came in 2012 when two Stanford professors, Sebastian Thrun and Peter Norvig, presented Introduction to Artificial Intelligence as a for-free MOOC. This not only attracted interest in academia, but also covered over 160,000 learners worldwide, and was heralded as the first truly 'massive' open online course (Mehaffy, 2012). Within a year, dubbed 'The Year of the MOOC' by the *New York Times* (Pappano 2012), further announcements came from Stanford with Professors Daphne Koller and Andrew Ng launching Coursera, and the University itself launching two further MOOC platforms, Class2Go and NovoEd. This wide-scale movement demonstrated both academic and learner interest in MOOCs. Stanford also announced an alliance with the not-for-profit MOOC platform edX (launched in 2013 by Harvard and MIT), aiming to build a community of open-source developers. The early cMOOCs aimed to engage learners in innovative pedagogy, whilst the latter MOOCs, through Coursera and edX, aimed to engage learners in accessing materials from renowned universities. In 2012, the OU in the United Kingdom sought to do both by announced the development of the MOOC platform FutureLearn, which launched in 2013 in partnership with the British Library, British Council and British Museum, and over 100 universities to date. Such activity is not confined to the United States, Canada and the United Kingdom, as further independent MOOC platforms have launched in Australia (Open2Study) and Germany (iversity) (Lewin, 2013), demonstrating a global interest.

Through understanding how MOOCs have developed from OERs and the type of demographic that will enrol on them, the next stage of the literature review assesses how to define that learner.

2.3 Informal and Non-formal Learners

For the purpose of clarification the terms 'non-formal' and 'informal' were reviewed when referring to not-for-fee study. 'Non-formal' is used to describe focussed, conscious, not-for-credit study such as MOOCs whereby a learner is making a conscious effort to undertake free learning. 'Informal' is therefore used to describe unconscious learning such as viewing an educational programme that may generate an interest in progressing through to non-formal learning. These definitions (Cedefop, 2000; Colardyn and Bjornavold, 2004) have yet to be fully adopted by the academic community, with the terms being used interchangeably within academic journals and papers. Consistency will be given within this thesis and 'informal' will be used when referring to a learner undertaking a MOOC as the literature reviewed has used this term. However, though this is the terminology used within the body of the research, the responses given by the learners in interviews during the Initial Study included referring to themselves as 'students' and their learning as 'study' as they are more used to these terms from previous exposure to formal education. Within this thesis the term 'learner' will be used in the body of the research.

As the engagement of learners on MOOCs will be the focus of the thesis, the next section will identify what is meant by engaging in learning, the literature currently available and how this then leads onto Section 2.5 which describes learning design for MOOCs.

2.4 Engagement of Learners

The literature related to technology-enhanced learning includes few definitions of engagement, even when it is ostensibly the subject of the paper (Cormier and Siemens, 2010). Most definitions of engagement in learning refer to the traditional classroom setting (Becker, 2000; Kuh, 2001; Kuh and Gonyea, 2003; Ahn et al., 2013; Milligan et al., 2013; Ramesh et al., 2013).

2.4.1 Engagement outside MOOCs

In these settings, engagement is typically associated with attendance, participation in discussion and grades achieved (Bulger et al., 2008; Noe et al., 2010; Moley et al., 2011; Heaslip et al. 2014; Ramesh et al., 2013). Although these do not align exactly with practice in MOOCs, they focus attention on access to or interaction with course content and activities, course discussion and course interaction.

Fredricks et al. (2004) defined student engagement as a 'meta-construct' of complex and multifaceted components that provide an explanation of student success (Fredricks et al, 2004, Section 2.4). This construct consists of three components: emotional engagement, cognitive engagement and behavioural engagement. There are difficulties in applying this construct to MOOCs. For example, with regard to emotional engagement, in the context of this theory the student creates an emotional bond with teachers and fellow students. Whilst this is entirely feasible within a classroom setting, within a MOOC it is more complex as teachers (labelled Lead Educators and Mentors in FutureLearn) do not necessarily engage individually with any of the learners. In addition, due to the large cohort sizes, running into the thousands and sometimes tens and hundreds of thousands, forming emotional bonds with fellow learners may be overwhelming or difficult to achieve. Some learners could be considered to form an emotional engagement with the course and the learning materials, but this is not directly comparable to forming a bond with another person.

Cognitive engagement takes place when the student completes a learning activity within the classroom (Helme and Clarke, 1998). Though such activities are likely to be mandatory elements of classroom-based lesson planning, in MOOCs the learners are self-directed and can choose which activities to undertake, depending on what motivated them to join the MOOC (Young, 2013).

The final component of Fredricks et al.'s (2004) theory of engagement is behavioural engagement. For this to develop a student must undertake a physical activity involving attendance or assignment completion. Again, this is difficult to transfer into the MOOC environment as learners can study at

their own pace while the course is open to them and are not required to engage with any of the activities if they choose not to do so.

Kahu (2013), in her paper on framing student engagement, explores behavioural dimensions of engagement, incorporating digital observations, online time to task, effort and participation, which are all relevant to the study of MOOCs. Her work demonstrates the complexities of the multidimensional concept of engagement and how institutions can affect it. There can be a strong link between social and academic engagement (Coates, 2007) and Finn et al (2003) go so far as to argue that social engagement is the foundation of academic engagement.

Overall, definitions of engagement in a classroom setting cannot easily be transferred to MOOCs. This is in part because they are framed on the basis of physical presence in the learning environment, partly because they assume that learners will be taking part in similar activities, and partly because they assume that learners will be motivated to undertake all activities necessary to complete the lesson or course. It is therefore necessary to consider how engagement is understood in MOOC settings.

2.4.2 Engagement within MOOCs

Engagement is an outcome that is seen to be important for MOOCs (Ahn et al., 2013; Yang et al., 2013; Yuan and Powell, 2013; Glance et al., 2014). Despite this, it is a term that is not clearly defined. In the paper 'Through the open door: Open courses as research, learning and engagement' (Cormier and Siemens, 2010), the term 'engagement' is only used twice: once in the title and once in the opening paragraph. A similar assumption that the meaning of the term is clear occurs repeatedly within the literature (Becker, 2000); Kuh, 2001; Kuh and Gonyea, 2003); Ahn et al., 2013; Milligan et al., 2013 and Ramesh et al. 2013). Even when studies deal with engagement and its measurement, they do not provide a definition of the term (Seaton et al., 2013; Guo et al., 2014; Ferguson and Clow, 2015; Ferguson et al., 2015; Kizilcec et al., 2013 Ferguson and Clow, 2016).

In most of these studies, proxies for engagement are identified, and these proxies vary, depending on the type of MOOC. The Coursera platform has a strong focus on the viewing of content, particularly videos, and assessment. As a result, studies of engagement on that platform focus on interaction with content and assessment (Kizilcec et al, 2013) or on interaction with videos (Seaton et al, 2013, Guo et al, 2014). Guo et al. (2014) focussed their research on learner use of video content, which was measured by how long a learner watched a video and whether or not the learner then attempted the post-video assessment. They considered engagement to be a pre-requisite for learning and quantified it by mining learner interaction logs. Though they refer several times to 'true engagement', it is left to the reader to deduce that by engagement they mean accessing course content and attempting assessment.

Kizilcec et al. (2013) identify 'so-called noncompleters' (those that do not meet the criteria for certification) who are selective about the aspects of the course they engage in. However, they do not explore this form of engagement any further and instead focus on video lectures and assessments. They allocate learners to four distinct categories for assessment and video engagement: 'on track' (assessment completed on time), 'behind' (assessment completed late), 'auditing' (did not complete the assessment but watched a video or completed a quiz), and 'out' (did not participate with the course at all). These categories are referred to as 'engagement descriptions'. Therefore, although the paper does not define engagement, it can be understood to refer to interaction with course content and undertaking assessment.

Unlike Coursera, the FutureLearn platform is underpinned by a pedagogy of conversational learning and so studies of interaction on that platform consider not only interaction with content and assessment, but also the social interaction represented by commenting or liking (Sunar et al., 2016; Ferguson and Clow, 2015; Ferguson et al., 2015; Ferguson and Clow, 2016; Haywood et al., 2013). Ferguson and Clow (2015) used the categories developed by Kizilcec et al. (2013), as the foundations for their research. They do not define engagement, but they do note that; 'the learning objectives of

these learners may be met without working through an entire course', making it explicit that course completion and engagement are not synonymous – learners can engage without completing. The categories they focus on are: 'active engagement' with course content, 'active engagement' with course assessment, and 'active engagement' with course discussion. Their use of these terms suggests that 'active engagement' is synonymous with interaction. This is also reflected in the 2015 paper by Ferguson et al.

In a later paper by Ferguson and Clow (2016), they identify seven patterns of engagement; Samplers, Strong Starters, Returners, Mid-way Dropouts, Nearly There, Late Completers, Keen Completers. Once again, they focus on interaction with course content, course assessment and course discussion. They note that 'patterns of engagement…are influenced by decisions about pedagogy'.

Ramesh et al. (2013) classify learner engagement in MOOCs into three categories: active engagement, passive engagement and disengagement. A disengaged learner is identified by a decrease in their level of posting, viewing, voting and assessment submission. However, decrease may not actually signal disengagement, but a shift to a different pattern of behaviour. These learners may have started 'lurking', posting infrequently or not at all (Nonnecke and Preece, 2001). They may have shifted towards being passive rather than active participants (Milligan et al., 2013), or they may be applying 'surface-level processing', memorising content rather than developing deep-level understanding (Biggs, 2001; Tagg, 2003). This means that it is difficult to deduce levels of engagement from platform-use metrics.

Learners may also treat a MOOC as an 'uncourse' (Hirst, 2009), deviating from the linear path set out for them (Gore, 2016) and not engaging in the forums and discussions as and when expected, even if these are deemed 'essential' (Mak et al. 2010). Those learners may not feel that they have disengaged, but that they have adapted the course to suit their needs as self-directed learners (Belz and Muller-Hartman, 2003). As MOOCs attract high numbers and great diversity in the learner population, the development of autonomy in learners is welcomed (Mackness et al., 2010) and

learners cannot be expected to study the course exactly as the educator has planned. For example, they may find the discussions overwhelming (Lau, 2014) and withdraw from them. This cannot be taken to mean that they are no longer engaging with the course.

Many studies have investigated the issue of completion of MOOCs (Jordan, 2014; Reich, 2014; Jordan, 2015). However, studies that conflate MOOC completion with MOOC engagement confuse the picture. Engagement is a more complex concept than completion and needs to be examined at a more granular level. (Haggard, 2013; Kizilcec et al., 2013; Wang and Baker, 2014).

Learners may consider themselves engaged in the course and making a 'psychological investment in learning' (Newmann, 1992). However, they may not be interested in engaging on the timescale set by the educator. The date range frequently used to analyse MOOC activity is between the course start and end dates (Kloft et al., 2014; Perna et al., 2014; Jansen and Schuwer, 2015; Jordan, 2015). If learners are not active on the course between these dates, they are likely to be classified as disengaged even if they later go on to complete the course. This suggests that the date ranges set for set for data collection and analysis should take into account the possibility of engagement long after the formal end of the MOOC run.

Overall, the MOOC literature implies that engagement refers to the frequency and depth of learner interaction with content, assessment and discussion. As discussed above, the level of this interaction does not necessarily correlate with learning or with course completion. Learners who complete a MOOC must have engaged with it (although they have not necessarily learned anything), but many more learners engage (and possibly learn a lot) without meeting the platform's definition of a completing learner. Many learners access content but have no intention of completing (Kizilcec et al., 2013), selecting particular topics to study rather than accessing the course in its entirety (Wang and Baker 2014). Some learners consider MOOCs a hobby and consider parts of to be a form of educational entertainment (Young, 2013), some are looking for personal satisfaction, others are focused solely on elements aligned with certification or skills for professional practice (Agarwal

2012; Breslow et al., 2013; Hew and Cheung, 2014). The factors affecting engagement are therefore complex.

There has also been a tendency to bundle all MOOC content and activities into a single category, or into a limited number of categories. Research has been conducted, for example, on the use of videos and forums in MOOCs (Yang et al., 2013; Ramesh et al., 2014; Rosé et al., 2014; Sinha et al., 2014a; Wen et al., 2014a; Wen et al., 2014b) but there has been little investigation of learners' views on all collective component parts of a course – forums, videos, articles, transcripts, quizzes and activities – and which they prefer to engage, or not engage, with (Lie et al., 2014; Sinha et al., 2013; Sinha, 2014b).

2.4.3 Defining engagement in MOOCs

Overall, engagement is seen to be an important construct within MOOCs but it has not been clearly defined. It cannot be taken to be synonymous with course completion, as learners may engage without completing, or even wanting to complete, a MOOC. It also cannot be taken to be synonymous with learning, as proxies for engagement provide only limited insight into a learner's thinking or motivation. These proxies are typically taken to be access to or interaction with course content, activities, discussion or assessment.

These elements are sometimes bundled together, but they can be disambiguated by considering the role played by different elements (steps) of the MOOC in terms of learning design. A step designed for collaboration or conversation could prompt engagement in terms of commenting or responding to comments. A step designed for assessment should provoke engagement in those terms.

This thesis therefore defines engagement in terms of the proxies for learning used in previous studies (Kizilcec et al. (2013, Ferguson and Clow, 2015, and Ferguson and Clow, 2016). The measurement of engagement is taken to mean accessing or interacting with one or more steps of a MOOC at any time from the course opening until [two weeks] after the course has officially come to

an end. Low levels of engagement are associated with limited evidence of access or interaction, while high levels of engagement are associated with evidence of access or interaction that involves multiple steps or different time periods. In line with other MOOC literature, 'complete engagement' is taken to refer to completion of the MOOC (the activities required to complete the MOOC are defined by the lead educator and the MOOC platform). Proxies of engagement that will be used in this thesis will include: visiting different types of step, posting comments, and liking comments previously posted by other learners.

2.5 Learning Design for MOOCs

The principle of learning design is to develop a range of activities associated with an overarching learning activity or course that leads to the development and successful achievement of pre-determined outcomes (Conole and Weller, 2008). This principle is followed in the learning designs of formal modules at the OU and in the learning design of informal learning, in which MOOCs are included.

Conole (2010) identified six beneficial reasons for the adoption of the learning design approach:

1. A vehicle to elicit designs from academics in a format that can be tested and reviewed, with a common understanding and vocabulary
2. The possible reuse of content beyond simply sharing
3. Guiding individuals through the creation process
4. Creating an audit trail on design decisions
5. Highlighting the need for staff development and resources
6. Aiding the guidance of learners through complex activities in an activity sequence.

This is closely aligned with the benefits outlined by Gibbons and Brewer (2005): improving the rate of progression, influencing design concepts, making the design process explicit whilst improving the design and its tools, and bringing design and production into alignment.

The ethos of MOOCs differs to their traditional face-to-face classroom counterparts with learners able to view the course teaching online in its entirety, and given the ability to pause, playback, skip and repeat activities to fit their own learning requirements, providing digitally mediated education (Knox et al., 2012). Unlike in a traditional face-to-face classroom setting, multiple choice questions can be retaken in the privacy of a learner's home without a sense of judgement from their peers or fear of failure. This may explain the stark difference between MOOC and formal qualification completion (Brown, 2013) and forms the basis of Chauhan's argument for proctored MOOC assessment (2015).

In assessment, multiple attempts allow the learner the ability to develop their knowledge by using the instant feedback provided upon the selection of an incorrect answer to assist in deepening their understanding and ultimately (when such learning is applied) selecting the correct answer (Piec et al., 2013). Assessment has moved beyond machine grading, with Coursera devising the largest peer-grading system to date with thousands of learners reviewing and assessing each other's work (Piec et al., 2013). Thus, assessment is part of the learning design as it aids the learner in deepening their understanding of the concepts within the course.

Due to the recent emergence of MOOCs, most of the literature reviewed was concerned with formal study, which is at a lower scale and narrower range (or of less frequency) than that of learning (such as Gleeson and Donnabhain, 2009). The introduction of the element of learning creates an extra tension that makes it difficult to achieve balance throughout the learning design.

The introduction of learning to a wider, larger and subsequently more diverse population may result in an over-reliance on the system to deliver the learning, therefore resulting in an attempt to create a generic 'one size fits all' (Friedman, 2012) with regards to learning design. This over-reliance can lead to a sense of 'indoctrination' (Chomsky, 2012), in the trapping of learners in a system by treating education as a market and its learners as customers. Dependence on a system instead of the learning design may not benefit the engagement within MOOCs by learners.

Winograd (1996) argued that 'design' is not a static noun, but instead an organic activity that evolves and develops, identifying design as a conscious process, a dialogue with materials, a creative process, a communicative process and a social activity. And so learning design must be seen as evolving and this research wishes to develop a further understanding of how learning design does and does not impact on learner engagement.

Even though MOOC platforms have originated in the West, learners register across the globe, leading to courses and platforms being created outside of the West also. Whilst this produces a rich and diverse cohort of learners on MOOCs, it does pose a few learning design challenges:

- Learners may be accessing and posting content 24 hours a day due to time zone differences and may post requests for assistance out of (MOOC host) hours. Though the learner is not in the same time zone as the MOOC host or the platform, they expect the same level of engagement with the course and their fellow learners.
- Learners' backgrounds and digital and information literacies may vary greatly, so understanding how to search and analyse with the content is highly varied, making engagement with it difficult at times.
- A range of MOOCs is presented in English, though this may not be the learner's first language as only approximately 5 percent of the world's population consider English to be their first language (Central Intelligence Agency, 2013).

In design-based research, whether the characteristics (Reiguluth and An, 2009) are set by the course view map or the course dimensions view (Conole 2008), there is a repeating pattern in what Wang and Hannafin (2005) define as systematic but flexible learning design.

Learning design has been a fairly recent emergence on the educational landscape in the application of whole courses versus individual lesson plans. However, Holden (2009) commented that the design that the OU has provided since the 1970s is due to its unique nature of delivery of distance

education to scale. Due to this scale Holden noted that the OU's approach needed to be more generalist than specialist in view of designs used. This more general view is understandable given the sheer volume of students the OU delivers education to, which is, as Koskinen et al. (2011) describe, 'the "halfway" between people and things'. It is this learning design to scale that has been translated into MOOC production for the FutureLearn platform.

However, there can be a 'resistance to learning' (Atherton, 1999) that needs to be taken into consideration whereby ideas presented are incompatible with a learner's view of education and/or its design. In learning that is on a much larger scale (the OU has circa 200,000 formal students and circa 10 million learners), it is possible that the frequency of resistance could be deemed to be higher than that considered to be within formal learning, which in turn could impact on learner engagement, as it is difficult at scale to produce a specialist approach. This may be demonstrated within learner engagement with MOOCs given the large-scale and diverse enrolled population.

Dimitriadis et al. (2009) argue that teachers do not understand OERs enough to effectively reuse them, and this, coupled with the need for them to apply effective learning design suitable for the plethora of learners, increases the difficulty in creating suitable learning within the context. This could cause issues with learning designs of MOOCs, which can be constructed from OER materials.

Teachers may understand that learning can be developed through the 'mediation of artefacts' (Kutti, 1991) to include 'instruments, signs, language and machines' (Nardi, 1995), but Dimitriadis et al. (2009) state that this context should also include an abstraction of learning activities. This can include case studies, models, patterns, vocabularies or iconic representation (Conole, 2008). These are all different elements that comprise the ingredients to create OER objects for learning. These objects may be large and complex enough to be considered as individual learning designs, or most commonly are building blocks for the creation of a learning design. In the case of MOOCs, given the length of the courses, they can be constructed from individual existing OERs and ERs (educational

resources), or from the creation of new OERs and ERs with an adjoining or flowing narrative to create an engaging learning journey.

Each OER element may have been designed differently, by different academics, for different purposes, potentially causing an ebb and flow effect for the learner that could impact on engagement to complete all the various elements. Sequencing of methods and media (Lewis and Merton, 1996) requires close scrutiny in the construction of learning design and the establishment of course overview (Harrison, 1994). The planning, management and guidance of the learning design needs close attention, not just in course narrative, but also the elements within. Much consideration has been given to the academic viewpoint on the creation of learning design, so further insight into the learner's viewpoint needs to be gained.

With the emergence of online learning materials and wider access to unlimited internet with the development of broadband, it is now possible to create learner-centred online learning experiences of materials, tasks and activities to fit learning styles and preferences. The access to learning materials does not even need to be linear with the ability to dip in and out of resources via online search engines, with learners able to select elements that they wish to learn, which may not be a course as a whole (Kizilcec et al., 2013; Wang and Baker, 2014; Gore, 2016). This slightly more modular and disjointed approach can have ramifications on a learning design with learners cherry-picking the 'best' elements of a course to suit their needs, with the additional possibility of the learner accessing these elements in a different order to the one the learning designer intended (Hirst, 2009; Gore, 2016).

The difficulty with this non-linear approach is that the learner may not be able to engage with the increasing learner challenges that the course may present. An imbalance of skill and challenge can negatively impact on a learner's 'flow' (Csikszentmihalyi, 1975), that is, moving through the learning material at a consistent engaging pace without feeling overtly challenged to the point of disengagement. Entwistle and Tait (1990) stated that the perception of a learning environment does

have an impact on learning and the quality of the resulting learning outcomes. This perception may have a positive or negative impact on engagement and therefore requires further research within data collection and analysis to see whether the most engaging steps of the MOOCs are linear.

Designs should be created for the context in which they are to be used, and also with an understanding of how the materials are to be learnt and what learning outcomes are to be achieved. However, designs should not be static but should carry the ability to be adapted, redesigned and reused. As defined by Koper and Olivier (2004), learning design is 'an application of a pedagogical model for a specific learning objective, target group and a specific context or knowledge domain'.

The OU has over the years developed learning design taxonomies suitable for delivery in online environments. At present with MOOCs there is no standard way of addressing learning design due to the range of types of MOOCs available as indicated in Section 1.7.4. Therefore, given the OU's experience in learning design of online courses, the learning design taxonomy adopted by the OU for MOOCs is the product of a JISC-funded (Joint Information Systems Committee) Open University Learning Design Initiative (OULDI) (The Open University, 2016). Learning design at the OU is practice based, allowing academics to map modules based on informed decisions and pedagogical focus, known within the OU as 'learning outcomes'.

The tools used by the OU combine text, graphics and learning activities and are based on a taxonomy developed by Conole (2010). Each module's learning outcomes are visually captured and classified using the taxonomy in Table 1 below. In the mapping of the module, its workload or number of hours of study are also identified to meet the learning outcomes (Thorpe, 2006). As categorising learning activities is subjective, each Learning Design Workshop is led and recorded by a Learning Design Manager to ensure consistency in approach.

Table 1: Learning Design Activities

	Types of activity	Example
Assimilative	Attending to information	Read, watch, listen, think about, access
Finding and handling information	Searching for and processing information	List, analyse, collate, plot, find, discover, access, use, gather
Communication	Discussing module-related content with at least one other person (student or tutor)	Communicate, debate, discuss, argue, share, report, collaborate, present, describe
Productive	Actively constructing an artefact	Create, build, make, design, construct, contribute, complete
Experiential	Applying knowledge in a real-world setting	Practice, apply, mimic, experience, explore, investigate
Interactive/adaptive	Applying learning in a stimulated setting	Explore, experiment, trial, improve, model, stimulate
Assessment	All forms of assessment (summative, formative and self-assessment)	Write, present, report, demonstrate, critique

(Rienties et al., 2015)

Once mapped, the learning designs are reviewed to ensure a balance of learning design activities and are recalibrated as the module authoring takes place to provide an accurate reflection of the module at completion. Later, evaluation of the design can take place when reviewed with the subsequent learning performance data. This method has been transferred from formal module production to MOOC production.

2.6 Highlighting Gaps in the Literature Review

The literature reviewed within this study has demonstrated that research has already been undertaken with regards to MOOCs and engagement with formal courses. However, little research has been undertaken with respect to the engagement levels of learners that are a stronger fit to the JIFL journey and therefore are of more interest to universities than the current MOOC demographic. This is especially of interest by universities in hosting their formal qualifications in full on MOOC

platforms. What the review also highlighted was the lack of a definition of engagement and that academic focus had instead been given to the measuring of engagement in the absence of a definition. This made it difficult to ascertain what is meant by the term 'engagement'. Much focus in measuring engagement had been given to course completion, and whilst that may be of relevance to the MOOC host (in terms of revenue generation) it may not be relevant for the learner. Of the literature reviewed the focus was on completion statistics rather than engagement with elements of the learning design. A course being completed by learners does not give an indication as to how the learners interacted and engaged with the learning design elements within the course.

What this review has demonstrated is that there is a strong requirement for commercialisation in the engagement of learners who are suitable for a JIFL journey in either undergraduate or postgraduate formal education, as it is the strategy of many universities to convert learners through MOOCs into formal students. Even if a learner has no desire to become a formal student it is still within the education provider's interests to ensure that the learner feels that they are capable of undertaking and completing learning.

The literature reviewed illustrates gaps that research questions must consider the learner's reasons for engaging with MOOCs and the concepts and elements of learning design within the course that learners have engaged with the most, to ascertain what impact this would have on overall course design.

2.7 Research Questions as a Result of the Literature Review

One of the themes emerging from the literature reviewed to date is that there has been an expression of academic interest in the retention and completion figures of a range of MOOCs. However, very little literature has been dedicated to the engagement of the learner with the content and why they initially engaged with the course (much emphasis is placed on the course being 'free' rather than its content, the Lead Educator, the university facilitating the course, how it is delivered and how it can be studied), thus creating a gap in the academic literature.

A further emerging theme is the emphasis on learning design. Research has begun in the field of learning design within modules and qualifications (Rienties et al., 2015); however, no significant research has been conducted to date on the learning design of MOOCs in the same way.

The attraction to engage and the elements that maintain engagement with learning design need to be understood as there is a distinct gap in the literature regarding this, and this understanding will benefit academics and learning design teams in the creation of MOOCs. Hence the research questions for the Main Study and thesis are:

1. *Why do learners engage in massive open online courses (MOOCs)?*
2. *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

Addressing these questions should guide the understanding of these issues. The data collection will be designed to aid in addressing the first research question from questioning specifically the reasons for attraction to and engagement with MOOCs. With regards to the second research question it is possible to undertake a study at the OU of MOOC learning design as all MOOCs created for the FutureLearn platform underwent a formal learning design process. Since each of the MOOCs has undergone a number of presentations on the FutureLearn platform, a longitudinal study can be conducted to reliably ascertain how the learning design had a positive impact on engagement. The next chapter provides the methodology used to address these research questions.

Chapter 3: Methodology

The previous chapter gave a review of the relevant literature before identifying the gaps that have become the main focus of the research as identified in the research questions. This chapter describes the methodology selected to collect the data required to address each of the research questions ensuring that the discussions and conclusions drawn are reliable and valid.

The focus of this research and the methodology selected, now that engagement with learning design has been defined, is to identify the reasons learners become engaged with MOOCs and which elements of MOOC learning design they engage with the most. This will ultimately have an impact overall on MOOC learning design at the OU moving forward. This chapter outlines the overall research approach adopted for the thesis with relevant sections addressing different aspects of the research and the research questions. This includes the rationale in the decision making behind the methods selected to carry out each study. Section 3.1 addresses the epistemological and ontological perspectives, whilst Section 3.2 identifies the methods selected when conducting the Initial Study that led to the methodology chosen for the Main Study of the thesis identified in Section 3.3. Ethics were also carefully considered in this study and were reviewed at length prior to any study being conducted, as summarised in Section 3.3.4. The methodology selected for addressing each of the research questions in turn is identified in Section 3.4.

The perspective in the sections below is a combination of inductive and deductive reasoning based on the paradigm of enquiry by Dewey (1933), exploring learning by doing with emphasis on questioning, data analysis and critical thinking. Whilst the deductive approach aims to test the theories surrounding learning design and engagement in MOOCs within the literature reviewed and the definition hypothesis within this study, the inductive approach aims to generate new theory in this field. The deductive approach is formulated from the testing of literature review in relation to the data gathered from the surveys, and the inductive approach through the establishing of facts pertaining to reasons for engaging with MOOCs and the elements of learning designs that learners

engage with the most. From this the concepts of learning design for MOOCs at the OU to be hosted on FutureLearn will evolve.

3.1 Epistemological and Ontological Perspectives

In reviewing the purpose of the study, the epistemological and ontological perspectives that form the view of this research were reflected upon, as the choice of methods is influenced by the methodology chosen, which in turn is influenced by the theoretical perspectives adopted and the epistemological viewpoint. Whilst the ontological perspective is to understand what is, the epistemological perspective is to understand what it means to know and therefore provides the philosophical foundations of the study (Easterby-Smith et al., 2002).

There are different epistemological positions within research: objectivism, constructivism and subjectivism. With objectivism the belief is that reality is in existence independent of consciousness and is already a reality for the researcher to discover. Positivism is closely aligned with objectivism and argues that reality exists externally to the researcher and, through the use of scientific enquiry, must be thoroughly investigated. Constructivism is in contrast to both these positions as it rejects the view of human knowledge, with truth not already in existence in the external world but instead created in the subject's interaction with the world to construct their own meaning (Chia, 2002). In further contrast, subjectivism is based on meaning being imposed on the object by the subject from the collective unconscious (Crotty, 1998).

There are a range of theoretical perspectives within research, with positivism and themes of interpretivism being the most influential. Whilst there are other perspectives such as critical enquiry, feminism and postmodernism, upon review they would not be relevant perspectives for this study.

Positivism as noted earlier is rooted in the argument that the world and the truths within it exist externally to the researcher and can be quantified through observation. Reality is based on what can be seen, enquiry is based on scientific observation and empirical enquiry, and the sciences are based

upon facts not values. There are many different versions of positivism (Bryman, 2007) which overlap with one another, but can differ in essential themes. Therefore, Onwuegbuzie et al. (2009) state that modern quantitative researchers are post-positivist in stance, in that reality can be studied but observation can be fallible, only ever producing approximations, and deriving probabilities and not certainties.

Interpretivism is anti-positivist in its position, and views interpretations from the world (Crotty, 1998) to form views through classifications of schemas (Williams and May, 1996). With regards to epistemology, interpretivism is closely aligned with constructivism and follows the approaches of phenomenology, realism, symbolic interactionism, hermeneutics and naturalistic enquiry. Upon review of interpretivism and the approaches within, it was deemed not suitable for the type of scientific enquiry and measurement required to answer the research questions.

The epistemological stance of this research is an objectivist approach taken through the use of scientific enquiry and measurement, so data will be collated from the learners and from learner activity data from within the course presentations to understand how learners engaged with the content. Therefore, drawing from the above, the theoretical perspective is post-positivist as the reality for the responses to the questions posed is in existence. Unlike the positivist stance, post-positivism recognises that there are a number of alternative perspectives to the same research and all observations are inherently fallible. In short, this research can only give an indication as to the reasons for learners becoming engaged and with what elements of learning design for the specific MOOCs identified, and cannot be perfectly replicated across all MOOCs on varying platforms by different providers. However, the research in this instance will be investigated through scientific observation and empirical enquiry to ascertain probabilities in findings.

3.2 Methodology of Initial Study

As part of my doctorate research an Initial Study was conducted in order to understand which elements of learning design learners engaged with. This was undertaken to ensure appropriate data was collected for the Main Study.

This section provides a review of the research methodology considered for use to study the relationships between the research questions posed and the subsequent data gathered. Also included in this section are the developments of the Initial Study, data gathered, conclusions and recommendations made for the development of beta testing leading to the Main Study, and the approaches proposed for the analysis of the data in the Main Study.

The large number of learners enrolled in MOOCS means that there is a large population to contact for research. However, this could be achieved in a number of ways. There are a number of benefits in the use of surveys as open and closed questions can be created based on reasons for engagement, they can be sent to large populations, and responses received can be coded for analysis. Surveys also remove the possibility of interview bias and anonymity is assured so participants can be more honest as to why they engage with MOOCs. There are challenges, however, in that poor question design can cause problems with data collection and analysis, response rates may be low, participants may prefer verbal communication to the written word as English may be an additional language, or the questions may be poorly constructed (Foddy, 1993). With surveys there is also no opportunity to seek clarification from respondents, it may not be possible to detect flippant answers and the options for response may not cover the respondents' reasons for engagement. In addition, learners may only select from the options provided rather than giving their own response so the use of free-text fields is valuable (Schuman and Presser, 1981; Kenett, 2006). This may cause issues in addressing the research questions thoroughly.

In using interviews for data collection there are added opportunities for feelings or attitudes towards engaging with MOOCS to be explored beyond the options cited in a survey. This gives the

opportunity to probe further into the responses given, incorporating learners' emotions and prejudices (Charmaz, 1995; Charmaz 2013) about engagement with MOOCs. Such methodology allows the researcher to understand the experiences of the learners in depth (Reason, 1981) and gives the learners the opportunity to be more reflective and for the researcher to gain access to their social and cultural constructions (Guba and Lincoln, 1994; Silverman, 2000). The pitfalls in using interviews in a study such as this are centred on scale as it would be difficult to attain a sample size large enough using this method within the timeframe given that would reliably represent the large heterogeneous population of MOOC learners. In addition the answers given would need to be transcribed and clustered, and clustering may be considered subjective and open to bias (Oppenheim, 1992).

Instead of individual interviews, focus groups could be an option, and this is a more versatile method for gathering a wide response to questions regarding engagement. In addition debates within the group discussion may shed light on new questions, topics or themes on engagement not considered previously (Freeman, 2006; Stewart et al., 2007). However, some members of the group may not choose to speak during the sessions so their reasons for engagement would not be captured, and discussion may go off topic and need to be redirected back to the themes to ensure that the research questions are addressed (Morgan, 1997; Kitzinger, 1994). It is also possible that group-think may occur thus providing limited responses, data could be discursive so summarisation and interpretation of the results may be required, and there is the possibility of potential breaches in confidentiality (Kitzinger, 1995).

The final option deemed suitable for review is the analysis of forum comments, which, especially given the structure of the FutureLearn platform with the ability for learners to comment on every step, should be considered. On the other hand, due to the high volume of comments (the first presentation of the OU's Start Writing Fiction on the FutureLearn platform received over 120,000 comments), there may be a mismatch between the content within the step's comments and the

ability to match the sentiment to answer the research questions. The number of comments per MOOC presentation varies widely and data is discursive, so summarising and interpreting the results may be required, resulting in potential subjectivity that may stand in the way of a definition hypothesis being tested (Hofferth, 2005). The data is also at risk of potential breaches in confidentiality and there may be issues with contacting learners through FutureLearn to gain permission to use their comments within the research (Hinds et al., 1997; Thorne, 1998; Gladstone et al., 2007).

In light of the advantages and disadvantages of each of the methods reviewed for the Initial Study, the use of interviews to form the questions subsequently used in surveys would be the most suitable option for the primary source of data in addressing the research questions. The drawbacks to this methodology would have to be mitigated as well as possible through a thorough review with colleagues of the questions and survey layout. The use of surveys gives the opportunity to contact a higher number of participants to ensure enough responses are given to provide a reliable analysis to address the first research question. The provision of 'Other' as an option coupled with the addition of a free-text field for learners to type a response allows participants to elaborate on their responses or give additional reasons for engagement not provided for in the pre-text fields. A pilot test can be conducted before despatching the surveys to limit errors and the questions can be written in plain English to aid with any literacy or language issues.

3.2.1 Development and Execution of Initial Study

The aim of the Initial Study was to:

- Help refine the methodology for use in the Main Study through addressing the research questions identified
- Understand the viewpoints of why learners engage with MOOCs
- Identify any commonalities that may occur in the selection of the course and learners' subsequent engagement with it

- Inform appropriate data collection for the Main Study.

For the Initial Study the qualitative method of interviewing was used, to ensure that the methods identified for the Main Study (use of two surveys and performance data collection) were suitable. For the interviews a small sample of 12 candidates was selected via random sampling from the same open online course but hosted on two different platforms (one with options for learner social features and one without).

The participants were selected from the data collated from both FutureLearn and OpenLearn surveys on the Moons MOOC. The reason for selecting both platforms was to ensure that the subsequent questions formulated for the survey were as reliable as possible. The reason for selecting Moons as the MOOC for analysis was due to it being one of the first MOOCs that the OU produced and therefore enough time had subsequently passed for the learners to have engaged with it, if they had wished to. The participants were contacted via email an inviting them to partake in an interview, with their details hidden via the BCC (blind carbon copy) functionality. A reminder email was despatched ten days later to those that had not yet replied with the further option to be removed from the mailing list. Of the 24 that were emailed two asked to be removed from the mailing list. Twelve participants agreed to be interviewed, six from each platform, with a further one from each platform available for interview if an interview was cancelled.

All interviews but one were conducted via telephone, with the other via audio Skype as the participant was based overseas. This method was selected as the learners were not within commutable distance for a face-to-face interview. The interviews were ten questions in length and took approximately 20–30 minutes each to complete (see Appendix 1).

The questions were as follows:

1. *What free online courses are you currently studying or last studied?*

Rationale: Ice breaker question to find out the learning background of the interviewee, what they like to study, how often they study, etc.

2. *Why do you study free online courses?*

   Rationale: To find out why they study (personal enjoyment, professional interest, academic advancement, etc.) which helps to categorise the learner.

3. *Do you like to study free online courses that are intellectually challenging?*

   Rationale: To find out if the learner likes to be challenged or to stay in their comfort zone. Some learners may remain engaged with something that challenges them, others with something they feel comfortable with.

4. *Do you like to study with other learners or on your own?*

   Rationale: To find out if the learners are engaged when learning in a community or prefer to learn by themselves. Some find learning communities engaging while others find them disengaging.

5. *How do you manage your time to study?*

   Rationale: To understand how a learner allocates study time: whether it is planned out or ad hoc.

6. *Have you ever been bored by a free online course if so, what did you do about it?*

   Rationale: To find out whether the learner persevered with the course, even though they were bored/struggling, or whether they dropped out.

7. *What attracts you to a free online course?*

   Rationale: To understand the initial engagement with the course: was it a subject that interested them; was it the title, the content or the Lead Educator; was it topical; was it needed for work?

8. *When studying one course, have you ever changed it before finishing it for another one?*

   Rationale: Linked to question six. To find out if a learner was struggling/bored with the current course, but still engaged to learn so selected a more suitable course than the one they were initially learning.

9. *Have you ever skipped sections of a course, or learnt it in a different order to how it is set out?*

   Rationale: To see if learners follow courses in a linear manner as mapped out in the learning design, or whether they cherry-pick the best bits, change round the order, etc., which may have an impact on learning design elements.

10. *Would you like to add anything to your interview answers?*

    Rationale: To give the interviewees an opportunity to add anything they wish to cover in more detail or add anything that was not covered by the questions, which helps to map out the survey questions.

Eleven were interviewed during what is considered the 'working day' whilst the final participant was interviewed during the evening. All participants were asked what date and time and what method of contact (telephone or Skype) would suit them best. The interviews were transcribed initially by hand, and then transferred to electronic files for storage and analysis. Each participant was allocated an identification number under which all their files were stored.

3.2.2 Findings from the Interviews for the Initial Study

All the interviewees were allocated a number on point of contact; this number remained allocated to the participant upon point of response and interview. At no point were the numbers reallocated to ensure that the files remained uniquely allocated to each participant. This would allow for late-replying candidates to be interviewed in addition to the interviewing of substitute candidates if one of the finalised six were to cancel, or further follow-up interviewing of candidates if required. Appendix 2 contains excerpts of the interviews transcribed.

The data was analysed first through transcribing the responses given at interview, and once all interviews were fully transcribed the data was coded to identify themes (Braun and Clarke, 2006). From this all the transcriptions and themes were readdressed to ensure that the themes isolated were reliable. Key words and phrases were identified as part of the coding process (Fereday and Muir-Cochrane, 2006), and were re-read and amended as necessary. In breaking down the data into smaller units, connections between the categories were made (Dey, 1993), and the key findings are outlined below.

All but one of the participants (OL12) responded that they had since gone on to enrol on a further MOOC or in formal study since they enrolled on Moons. All the participants stated that they liked to study courses out of personal interest, with one (FL11) adding the relevance of study to their profession. Due to the subject of the course selected (Moons) the correlation of the course subject and the relevance to the workplace may have been higher or lower than in an alternative course. This may have been a limitation of the Initial Study which would not be replicated in the Main Study due to the range of MOOCs selected for analysis.

All participants stated that they liked to select courses that were intellectually challenging; however, all commented that they selected courses that were within subjects that already interested them. Two participants (FL01 and FL08) commented that they would never pick a course in the ‘fine arts’ as it would be of no interest to them.

One participant (FL08) commented he found the discussions on the FutureLearn course to be 'chaotic' and found it 'difficult to learn from others' as the other learners were just commenting on their activity. All of the learners said that they preferred to learn on their own, with two adding that they would participate in social activity (FL05 and FL08); however, neither stated that it would be as an alternative to lone study. Two participants (FL04 and OL11) added that if they joined or re-joined a course late due to personal commitments, they did not need to comment on the activities as the cohort would have been ahead of them or completed the course.

All but one (FL11) said that they had registered for more than one course at the time, but only one of them (FL11) had a specific time management strategy, the remainder stating that they 'just make time' (FL01), and learn 'when free' (OL09) and 'when time allows' (OL11). Two (FL04 and FL12) commented that they had completely abandoned a course at least once, while all stated that they did not always study to the course schedule and had intentions of returning to unfinished courses after course closure at a later date to complete them.

All stated that they generally followed the course structure except two participants (FL12 and OL07). However, some stated that they skipped parts that were optional (FL04 and FL05), such as long videos (FL04) or if they found it uninteresting (OL01), felt they already knew the topic being covered (FL12 and OL11), or if it was an activity such as an assignment which they felt they would not benefit from (OL09).

3.2.3 Conclusions of Initial Study

Taking into account the findings above, the four aims of the Initial Study were addressed and conclusions drawn as follows:

Aim 1: The refining of the methodology for the Main Study:

- The focus of the Main Study to address the first research question will be solely on the data collated from the surveys from the FutureLearn MOOCs presentations.

- It was found that interviews can only be used in a small sample size due to the length of time it took to contact participants, arrange interviews, conduct interviews, transcribe notes and analyse responses given. Therefore, data collation from the FutureLearn surveys was used as the main method for collecting data in the Main Study to address the first research question.

Aims 2 and 3: Understanding the viewpoints of learners engaging in MOOCs and commonalities within:

- An initial understanding of the viewpoint of learners engaging with MOOCs was developed through the interviews and provided guidance on the type of data to collate from the FutureLearn surveys.
- It was learnt through the responses given that learners do not always intend to finish the course within the timeframe given, and therefore a standard approach was used that took into account an additional two weeks on each presentation after course closure, to be measured for each performance dashboard, in aiming to address the second research question.

Aim 4: Appropriate data collection for the Main Study:

- The use of surveys is an appropriate way to collect data for addressing the first research question.
- The use of surveys is not appropriate for data collection to address solely the second research question. Instead the selection of performance data will be required to focus on visits and numbers of comments and likes, firstly to take into consideration the advantages and disadvantages in methodology (outlined in Section 3.2 above) and secondly to identify the types of activities learners prefer to engage with: assimilative, communication, finding and handling information, etc., to aid in addressing the second research question. A learning

design engagement survey, however, would provide additional data in conjunction with the secondary data collected.

3.3 Methodology of Main Study

Building on the conclusions from the Initial Study, the use of data collected from the beginning-of-course surveys for each of the 19 FutureLearn MOOCs was identified as appropriate for answering the first research question. Performance data from within the presentations of the MOOCs was identified as appropriate for addressing the second research question along with the learning design engagement survey. The methodology for the Main Study was split into two parts to address each of the research questions.

3.3.1 Use of Quantitative Methods

From the Initial Study it was ascertained that not only was a wide and large data sample needed for research for the Main Study but also data collection through qualitative methods would not be an efficient method for data collection on this scale. The conclusion was drawn that to reliably address the research question, a dataset much larger in scale and scope than that in the Initial Study would be required for the Main Study. This was to ensure that generalisations as to why learners would engage with MOOCs were not drawn from a single MOOC or a single presentation of a MOOC, as found in the literature, but instead from multiple MOOCs across multiple presentations over a period of time. There were a number of challenges identified from the Initial Study. These were encountered in the scaling up of interviews to answer the research questions, namely, positive interaction with every respondent to elicit rich data, issues with reliability and validity of responses resulting in bias, problem respondents, transcription of a large number of interviews being time intensive, theming and grouping of responses being open to interpretation and a range of ethical issues such as the varying types of group-think that can occur if focus groups are used in the interviewing process (see Section 3.2).

It was identified that the use of quantitative methods would be the best approach. By utilising the beginning-of-course surveys (see Appendix Four), FutureLearn dashboards and associated course performance data from 76 presentations from across 19 MOOCs spanning three years, there is a reduced risk in making generalisations and inferences from limited information, as identified in the sections above. In the review of participants' reasons to study and subsequent engagement data of the entire responding population of these 19 OU MOOCs, the identified population can be defined as the total number of participants included in the study. This provides a large-scale population over a range of MOOCs across a three-year period by a single provider on the same platform, not previously published in the literature. Using this data for analysis prevents small-scale generalisations being made from a single or small number of MOOCs as to why learners engage with MOOCs and which elements of learning design they engage with most. As a result the research questions will be more reliably addressed.

Not all Joiners (learners who have enrolled on the course) responded to the beginning-of-course surveys (800,038 total Joiners to 120,842 beginning-of-course survey responses), and therefore the data collated will be referred to as responses, and the survey respondents as a representative sample population of the Joiners (full population) from within the 76 presentations of the 19 MOOCs (the sampling frame).

In addition to the use of pre-existing survey data from the course presentations, a further learning design engagement survey to address the second research question was developed for distribution to a smaller sample with the purpose to gather data on what learning activities (such as articles, videos and exercises) learners liked and disliked engaging with. This was developed as a result of the Initial Study as gaps within the pre-existing survey data and the data required for collection to address the second research question were identified. The self-completion survey was hosted online as the sample population of learners enrol and study open courses online, so the required demographic is suitably targeted. Capturing large-scale data through an online survey will help

determine factual information such as preferences, attitudes, behaviour and experiences (Weisberg et al., 1996). The design of the survey has taken into consideration Hoinville and Jowell's (1978) three prerequisites of survey design: purpose of enquiry, population specification and resources available. The survey questions selected addressed the research questions of engagement and learning design (See Appendix 3).

3.3.2 Sample Selection

From the analysis of the interviews in the Initial Study, it emerged that the reasons the learners were selecting the course (and other MOOCs that they mentioned) fell into two main categories: learning for personal interest and learning for work-related interest. This was an outcome in addition to the aims of the Initial Study, and one reflected on a small scale in the literature reviewed.

To explore further whether those learning for personal interest are more or less likely to continually engage with the material than those learning for work-related interest, or whether further reasons to engage and remain engaged in MOOCs will become apparent, a wider sample of data would need to be gathered. An application was made to access all the data associated with the 19 MOOCs and 76 related presentations selected for this research. The reason for selecting these MOOCs for this study was that the same learning designers and academic staff were involved in the production of all 19 courses. This not only gives a consistent approach to the learning design used at the time, but also gives multiple presentations to analyse due to their initial launch dates.

The data applied for included the beginning-of-course surveys totalling 120,842 responses, the FutureLearn performance dashboards and related activity CSV files through subsequent R reports (statistical reports) as registered by 800,038 Joiners (registrants) and accessed by 425,792 Learners (registrants who returned to the course once it was in presentation). The performance dashboard's content stores all learner activity data collectively for each presentation of a MOOC, and further detailed activity on collective engagement with individual steps was accessed via the exporting of R reports from the performance data.

The data selected is the largest sample with the widest range of MOOCs and highest number of presentations by a single university used for research into the field of engagement with MOOCs from the literature reviewed. This is significant as the literature reviewed to date refers to smaller sample sizes, in some instances produced by multiple teams across multiple providers. The variance in the production of previously reviewed MOOCs in the literature does not provide a consistent approach to learning design to produce larger scale conclusions from. By focussing on the range of 19 MOOCs created by one team at the OU, this provides a reliable sample from which to draw reliable conclusions to address the research questions.

For the distribution of the learning design engagement survey, due to the range of research being undertaken by various academics at the OU with regards to FutureLearn MOOC data, careful consideration and discussion was required as to how the participants for this study were to be selected. A random sample of 500 participants from each of the 19 courses were chosen, to provide a sample of 9,500 learners for the purpose of the study. Where multiple presentations existed, the random sampling would incorporate all cohorts to ensure that the level of repeat contact by other research studies would be kept to a minimum. As data is continually collected in new and repeating presentations this would ensure that the pool of participants would continue to expand and the likelihood of repeat contact be reduced, whilst providing a large enough dataset to address the second research question. Within this survey there was an opportunity for participants to submit their personal contact information for further research if required as part of this study.

3.3.3 Data Collection and Secondary Data Analysis

As the course surveys, dashboards and associated performance data are in existence prior to this research taking place, they are deemed as secondary data for analysis, as defined by Heaton (1998). The data was collected for other research interests, and this thesis now provides an alternative perspective on the original purpose for the data collection, and provides a new approach for its review following the principles set by Smith (2006). The data was collected by the Open Media and

Informal Learning department at the OU and the FutureLearn platform, and although it is used within my role on a daily basis, it is considered to be secondary data.

The benefit of this secondary data as identified in Section 3.3.2 on sample selection is the breadth and scale of the datasets available that could not be replicated through the creation of primary datasets through new surveys due to the volume of responses already collated over the time span of 76 presentations. As this secondary data is available at a far greater quantity, it is therefore possible to derive subsequent and more useful analysis from this than from the creation of a smaller primary dataset (Rabinovich and Cheon, 2011). As the data was collated from July 2014 to January 2017 it can provide evolutionary and sustaining explanations as to why learners engage with MOOCs and give reliable insights, due to the volume of presentations, about the elements of learning design that learners find engaging. Unlike with the Initial Study the use of secondary data for the Main Study ensures the anonymity of the learners is preserved. Most importantly, due to my sustained role within MOOCs since prior to the launch of the FutureLearn platform in 2013, the use of secondary data provides a detachment within the analysis allowing for a more objective review of the data to ensure reliability which may have been difficult to achieve in the design and collection of primary data (Szabo and Strang, 1997).

Data from the learning design engagement survey (which is separate to the FutureLearn performance data) is deemed as primary data as the collation of this data in response to a created survey is new. This is significant as it provides data additional to that already in existence and directly addresses the second research question. The data from this survey was collected via Qualtrics and held securely within the account for analysis via SPSS (Statistical Package for the Social Sciences) both of which have single account holder access. The survey allowed participants to remain anonymous unless contact details were submitted in the final question.

Through the use of typological analysis (LeCompte and Preissle, 1993: 257) the data was systematically classified. Initially the data was classified and analysed collectively as a set of 19

MOOCs for a full representation of the findings. The MOOCs were then reviewed and organised within subject groups and then as individual courses. This was to ascertain whether any themes or frequencies emerged through the application of secondary coding (Miles and Huberman, 1984). This process was used to ensure that the data was fully interpreted from multiple perspectives to reliably address the research questions.

3.3.4 Ethical Considerations

Before conducting any research an application to HREC (Human Research Ethics Committee) was made (see Appendix Five). To ensure full compliancy an enquiry for further submission to SRPP (Student Research Project Panel) was also made (see Appendix Six). As the samples selected would be randomised, and as a result OU students would not be specifically targeted, additional SRPP ethical approval was not required. Upon HREC approval a further ethics application was made to and granted from the Open Media and Informal Learning department to research and release OU MOOC data (see Appendix Seven).

In line with the guidelines of the British Educational Research Association (BERA) (1992) and the Association of Internet Researchers (Ess, 2002), the moral duty to respect privacy, confidentiality and anonymity was adhered to. With respect to interviews an introductory text was read out at the beginning of each (Appendix 1), and participants were asked whether they would agree to the presence of a recording device. All participants were informed that their responses would remain anonymous as they would be allocated an identification number for future reference within the research. For the learning design engagement survey (Appendix 3) in the Main Study, the introductory page of the survey displays the ethical research statement detailing the purpose of the research, how the research will be used, how to exit the survey at any time, contact details for further information, and informs participants that clicking to enter the questionnaire is a confirmation of acceptance of the ethical statement (information on how to withdraw is also given).

In terms of the FutureLearn performance data derived from dashboards and R reports, this research was compliant with the terms set by FutureLearn. Upon learners registering on the FutureLearn platform they are subject to agreeing to the terms and conditions set by the platform. Section 8 of the terms and conditions set by the platform states that FutureLearn conducts research citing the examples of understanding learner experiences and supporting academic research. Through accessing the platform the learners are consenting to their data being used for these purposes.

The allocation of a number anonymised participants in this process of data collection through surveys and interviews. The list of names to allocated numbers is kept in a password protected spreadsheet that will form part of the use, storage and disposal requirements of the other data gathered for the research. Only completed papers, reports and publications will be published whereby participants are anonymised to protect their privacy, addressing Bryman's (2001) ethical principles to ensure that the participants remain confidential and free from harm. Bassey's (1999) ethical values were also considered to respect the democracy of research, truth and persons involved, whilst adhering to the guidelines set by BERA (1992).

3.4 Addressing the Research Questions

The following sections of this chapter detail how the methodology selected will address each of the research questions.

3.4.1 Addressing the First Research Question

This section of the thesis concentrates on addressing the first research question: '*Why do learners engage in massive open online courses (MOOCs)?*' The beginning-of-course surveys sent to all 800,038 enrolled learners (Joiners) before the presentation start date were identified for use in answering this question. If a learner joins multiple OU MOOCs, they receive an email containing a link to each individual survey for the courses that they joined. Therefore, a learner could potentially respond to more than one survey for each different MOOC that they join, but only respond to one survey for each presentation.

Within the beginning-of-course survey the responses to the question '*Why are you interested in studying this course? (tick all that apply)*' were isolated for the purposes of addressing the research question. The results were collated and organised by MOOC, collectively by subject category (identified by FutureLearn's categories) and collectively overall. The purpose of the organisation of this collation was to identify whether learners had varying interests in studying depending on the individual MOOC or subject category (e.g. MOOCs within the Business and Management category attracted more learners with a professional interest than MOOCs in the Creative Arts and Media category), and to identify a pattern of interest in MOOCS overall at a top level.

3.4.2 Addressing the Second Research Question

This section of the thesis concentrates on addressing the second research question: '*What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*' The elements of the learning design reviewed for this research are the FutureLearn dashboard data, step activity associated with visits, comments and likes within each of the 19 MOOCs across all of the 76 presentations. The investigation was conducted via the review of the learning design documentation (outlined in Section 4.1.1 below) for each of the MOOCs and the associated performance reports collated from the data located within the presentations via an R report (a text file export of learner activity).

Through use of the FutureLearn data available there are a number of ways to review markers of learner engagement as defined previously. The most obvious, and most widely noted within academic literature, is the percentage of fully participating learners. However, not all learners that enrol have the intention to complete (Gore, 2016; Kizilcec et al., 2013) and so this will not be the measure for engaging learning design used in this research. For example, an engaged but passive learner would not be considered 'fully participating' by FutureLearn as observation of content is not enough; a learner is required to mark at least 50 percent of the steps within the course as complete, attempt all the quizzes and post a commentary contribution to be categorised as 'fully participating'.

Therefore, a learner could engage with the content on the steps, undertake the quizzes or post a comment but not feel the need to 'mark as complete' and only be considered a 'learner' by FutureLearn's standards. As highlighted in the Initial Study not all learners had the intention of becoming 'fully participating' but felt that they had engaged with the MOOC adequately for their needs (Wang and Baker, 2014).

The R report 'Step Activity' within each course was reviewed across all presentations to ascertain whether there was a repeating pattern to the number of visits to steps that learners engaged with. Though 'Step Completions' may be seen as a marker of engagement, learners may visit a step without marking it as complete (an optional electronic feature within FutureLearn) or mark it as complete without engaging in it in order to move to the next one (though this is not a prerequisite of the user interface). Therefore, the number of visits per step will be reviewed, not the number of steps that learners chose to mark as complete, as the purpose of the study is to review learner engagement rather than completion.

The 'Comments by Date' and the 'Likes by Step' R reports created markers of engagement with the content and with other learners through making and replying to comments and liking comments by other learners. A review of all the presentations gave an indication as to whether certain steps are repeatedly more engaging than others or whether engagement with a particular step or discussion is relevant to a single presentation. For example, an increase in engagement with a course or activity due to a coincidental marketing campaign, national event or item in the news may not be dependent solely on learning design. This ensured that the research was dependent on the review of the available data for addressing of the research question.

The reason why these markers have been selected is due to them being least open to interpretation because MOOCs have such a wide heterogeneous population. The use of multiple markers and not relying on one marker (e.g. 'fully participating') ensured that the research question was being responded to as reliably as possible.

Due to Step 1.1 in every course being accessed most by learners as their natural starting point regardless of content and/or learning design activity, this step was disregarded from the findings. Though Step 1.1 creates interest for the learner, it is naturally the most visited step, and receives a high number of comments and likes from learners posting salutations rather than active learning discussion.

Mapping and aligning the engagement markers with the relevant steps and associated learning designs gave insight into which steps, and therefore which elements of learning design, engage learners. This is possible due to how FutureLearn categorises step types (for example video, article, exercise and quiz) within the platform. For example, in a course a learner may find a video more engaging than the associated discussion (or vice versa) and on a standard web page these two learning design activities would usually be presented together but on the FutureLearn platform they are two distinct steps; thus, it is possible to distinctly identify whether learners found one learning design activity more engaging than the other. The drawbacks for this process are that the step types themselves do not directly map to the learning designs (e.g. a video may be assimilative, but depending on the learning outcome of the video it could be communicative, productive, etc.) so therefore all the steps identified were individually checked and mapped accordingly against the learning design taxonomy (see Table 1) to mitigate this.

For each presentation of a MOOC on FutureLearn there is an associated performance dashboard. The dashboards available from FutureLearn represent the learners' progress through the course and are categorised into the following Course Measures (as defined by FutureLearn at the time of writing):

- Joiners – learners who have enrolled on the course
- Leavers – learners who have elected to unenroll from the course
- Learners – learners who view at least one step in any week at any time within the course

- Active Learners – learners with user interaction with at least one step in the course (marking steps as complete, submitting content for review, or attempting a quiz or test)
- Returning Learners – learners who have interacted as active learners with at least one step in two or more weeks of the course
- Social Learners – learners who have commented on at least one step
- Fully Participating Learners – learners who have interacted with at least 50 percent of the steps and attempted the tests.

The dashboards were taken directly from FutureLearn two weeks after the final week of the MOOC being concluded. FutureLearn calculate their percentages for Active Learners, Returning Learners, Social Learners and Fully Participating Learners from the number of learners who have returned to the course (Learners) and not from the number who have enrolled (Joiners).

For the purposes of this research the data associated with Learners, Active Learners and Returning Learners will be reviewed. The number of Joiners is out of scope for research into learning design as the OU MOOCs have no preview option so learners can only engage with the course once it is live. Social Learners as a potential category of engaged learner is also out of scope as for a learner to be classified as a Social Learner only one comment needs to be made, which could be 'Hi, I am Hannah', 'Yes', 'No', etc., which may not be directly associated with engagement with the content. Fully Participating Learners are also excluded from this research for the reasons mentioned previously.

To further analyse the engagement the top ten steps for every presentation were isolated to identify which steps were repeatedly engaged with across all presentations for both comments and likes, both within a presentation and in any subsequent presentations. These shortlisted steps were then cross-referenced to identify which steps for each MOOC were in the top ten, most engaged with in each presentation for comments and likes combined. These 'Super Steps' were then mapped against the FutureLearn step taxonomy and learning design to define their learning design activities to identify whether there is a distinct pattern in the type, content or title of the step. By comparing the

results from presentations of the same MOOC and the results across the different MOOCs, patterns of step types and learning design activities could be identified.

In addition to the use of pre-existing survey data from the course presentations to address the first research question, a further survey (Appendix 3) was developed for distribution to a smaller sample with the purpose of gathering data on what learning activities learners liked and disliked engaging with, in order to aid the addressing of the second research question. This was developed as a result of the Initial Study. The self-completion survey was hosted online as the sample population of learners enrol and study open courses online, so the required demographic is suitably targeted. Capturing large-scale data through online surveys will determine factual information: preferences, attitudes, behaviour, experiences and beliefs (Weisberg et al., 1996). The design of the survey has taken into consideration Hoinville and Jowell's (1978) three prerequisites of survey design: purpose of enquiry, population specification and resources available. The survey questions strongly address the research questions of engagement and learning design.

For the purpose of this research the survey questions *'What parts of the course do you enjoy the most? (tick all that apply)'* and *'What parts of the course do you enjoy the least? (tick all that apply)'* were reviewed in conjunction with the remaining data collected to address the second research question.

The next chapter outlines the analysis conducted and the findings from the methods previously described to address the research questions within this study.

Chapter 4: Data Analysis and Discussion

4.1 Learning Design and Performance Data

Continuing on from the methodology identified in measuring learning design and performance data, this chapter records the data captured and discusses findings in relation to the research questions. It outlines each of the MOOCs selected for this research, their associated learning design and performance data before proceeding to address each of the research questions in turn:

1. *Why do learners engage in massive open online courses (MOOCs)?*
2. *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

In order to answer these questions Section 4.2 will address the first research question through the analysis of 120,842 survey responses from the MOOCs selected for this study. Section 4.3 will analyse the FutureLearn performance data for all MOOC presentations, enriched further by an additional learning design engagement survey which received 1,800 responses. From these performance data findings, the most engaged with steps in terms of visits, comments and likes were isolated and cross-referenced for each presentation resulting in the determination of 'Super Steps'. Due to the scale of the data being used for this study, typological analysis was applied to review the data for the MOOCs collectively, then by subject groups and finally as individual courses to reliably address the research questions from multiple perspectives.

4.1.1 Review of Learning Designs of MOOCs at The Open University Produced in 2014/15

During the academic year of 2014/15, 19 MOOCs were produced for the FutureLearn platform by the OU. The process for learning design for formal courses derived from OULDI was adapted for MOOCs in 2013 but these were produced on a condensed timescale. While a 30–60 credit module takes two years to produce from a three-day Learning Design Workshop, a MOOC in 2014/15 took 24 weeks to produce from a three-hour Learning Design Workshop. This is a scaled down replica of

formal course production which is conducted over a period of months and years at the OU from several full-day Learning Design Workshops.

The learning design taxonomy for the identification of learning activities for formal courses remained the same for all MOOCs produced (see Table 1). The taxonomy provides seven different types of learning design activities (Rienties et al., 2015). Assimilative activities may comprise watching videos or reading articles, and in finding and handling information activities learners are required to search for information, possibly hosted on a platform external to FutureLearn, to bring back to the course for posting within the comments section of the step. Discussion steps created to promote debate to lead to a learning outcome are classified as communication, whilst productive activities require the learner to create an artefact such as authoring a piece of fiction. In experiential activities learners need to apply their knowledge to their own setting, for example in applying the theory of budget management to their personal circumstances in the personal finance courses. Experimentation is encouraged with interactive/adaptive learning activities and used within the Basic Science MOOCs for learners to conduct experiments. Finally assessment presents in several forms through summative (end of course tests), formative (weekly quizzes) and self-assessment (peer review) activities.

During the Learning Design Workshop, the course ideas from the Lead Educator/authors were discussed and recorded by a Learning Design Manager into an Activity Planner using the classification identified in Table 1 (see Section 2.5). This provided future reference when writing the course content (known as 'module mapping'), resulting in the creation of visualisations of the activities and resources contained in each of the courses. These learning designs are displayed from Figure 2 to Figure 20. Though the learning designs for the MOOCs are mapped to this particular taxonomy, the FutureLearn platform's taxonomy is based on artefact types. Within FutureLearn the courses are split into weeks, then into individual steps and each step is identified by their taxonomy: articles, discussion, video, audio, exercise, peer review, quizzes and tests. For example, within

learning design a video may be both assimilative and interactive/adaptive (a video recording of an experiment for learners to recreate themselves), but within FutureLearn the step would be classified as a 'video' regardless of its content. Alternatively a step may contain information for learners to read outlining an activity on finding and handling information for discussion in the next step. Within the learning design, assimilative, finding and handling information, and communication types would be identified while within FutureLearn the steps would be allocated as 'article' followed by 'discussion'. For the purpose of this study though the FutureLearn classification was kept in review, for consistency and to reliably address the research questions centred on engagement with learning design. The taxonomy by Rienties et al. (2015) set out in Table 1 is adhered to.

4.1.2 Review Process of Individual Learning Designs

The Activity Planners for each of the 19 learning designs were exported and are presented below. The Planners categorise each of the learning activities according to the taxonomy outlined in Table 1 and show the associated time allocation, culminating in the planned workload for the MOOCs. This visual representation allows for ease in initial comparison of the learning designs of the MOOCs.

4.1.3 Review Process of Associated Performance Data

For each presentation of a MOOC on FutureLearn there is an associated performance dashboard. Within the dashboard are the overview statistics giving a snapshot review of the performance of each presentation and a number of datasets for export (comments, enrolments, question responses and step activity). In analysing the data from a combination of these datasets and the overview dashboard in conjunction with the learning design, it is possible to determine the success of the learning design in correlation to the learning performance data. For example, it is possible to review from the learning performance data whether the learning activities designed are engaging learners such that they reach their learning outcomes as identified by the academic authors. The completion of learning outcomes is verified through the learner successfully completing formative and summative assessment via quizzes, tests and self-assessment (peer review).

As these MOOCs have presented on more than one occasion since their production in 2014/15 it is possible to determine whether the engagement of the learners in particular steps repeats in subsequent presentations and is therefore associated with the learning design, or is isolated to one presentation whereby mitigating factors that may have increased external awareness and therefore increased registration and engagement with the course content may be the cause (e.g. anniversary of an associated event).

As outlined previously in Section 3.4.2 only the measures for Learners, Active Learners and Returning Learners were analysed:

- Learners – learners who view at least one step in any week at any time within the course
- Active Learners – learners with user interaction with at least one step in the course (marking steps as complete, submitting content for review, or attempting a quiz or test)
- Returning Learners – learners who have interacted with at least one step in two or more weeks of the course.

These dashboard metrics were selected as they provided the most useful indicators as to the number of learners that were engaging in the course. For example, Joiners cannot engage with the course unless they access it, thus becoming a Learner. Active Learners are learners that have accessed a step or attempted a form of assessment so are more engaged than Learners, and Returning Learners are engaging with content in multiple weeks of the course. These three metrics within the dashboard are a reflection of the volume of learners engaging with the learning design and are therefore of most interest to this study. As previously discussed in Section 2.4, completion figures are not being included within this study, as it is engagement with learning design, not completion that is the focus of this research.

The dashboards displayed in these progress reports are taken directly from FutureLearn two weeks after each course has completed a presentation. The courses below are displayed in alphabetical

order, due to some MOOCs being classified in multiple subject categories by FutureLearn, which has prevented them being grouped by subject for the purpose of this review.

4.1.4 Basic Science: Understanding Experiments

Basic Science: Understanding Experiments had four complete presentations from production to January 2017. The course is four weeks in length, comprising 39 steps, with a recommended study time of three hours per week, totalling 12 hours of study for completion.

The course is designed to be a hands-on kitchen chemistry course to develop learners' science-based skills in conducting scientific experiments and observations. Topics include the theory of osmosis, investigating changes of state and extracting DNA from fruit. The target learner audience is pre-university learners.

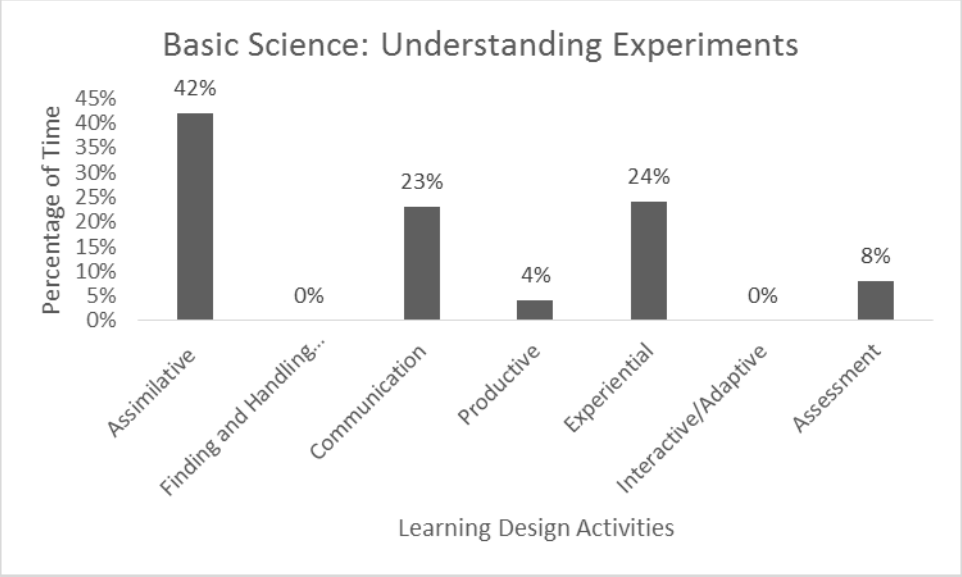

Figure 2: Learning Design for Basic Science: Understanding Experiments

The learning design demonstrates that Basic Science: Understanding Experiments is low in assimilative activities, in comparison to other MOOCs produced by the OU, with 42 percent of the course's steps being reading, watching and thinking about content. Though it is possible to comment on almost every step on FutureLearn, 23 percent of the steps are assigned to 'discussion' activities

whereby learners are posed questions to respond to and are labelled as such in the platform's step taxonomy. The activities falling into the productive and experiential categories are associated with the experiments that learners are to investigate, and discussion of their findings. Quizzes (formative assessment) are provided in Weeks 1 to 3, with a test (summative assessment) in the final week.

Table 2: Performance Dashboards for Basic Science: Understanding Experiments

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	2,679	2,079	1,645	2,373
Active Learners	1,954 (72.94%)	1,433 (68.93%)	1,101 (66.93%)	1,496 (63.04%)
Returning Learners	1,618 (60.40%)	692 (33.29%)	490 (29.79%)	678 (28.57%)

For Learners becoming Active Learners (marked at least one step as complete) the first presentation was more successful than subsequent presentations. The same pattern is observed with regards to Returning Learners, who have viewed content in more than one week. For example, there is only a 1.22 point difference in percentage between Learners becoming Returning Learners from Presentation 3 to Presentation 4 (29.79 percent and 28.57 percent respectively).

4.1.5 Basic Science: Understanding Numbers

Basic Science: Understanding Numbers had four complete presentations from production to January 2017. The course is four weeks in length, comprising 39 steps, with a recommended study time of three hours per week, totalling 12 hours of study for completion.

This course is designed to be presented in conjunction with Basic Science: Understanding Experiments as another hands-on course addressing the use of numbers in scientific findings.

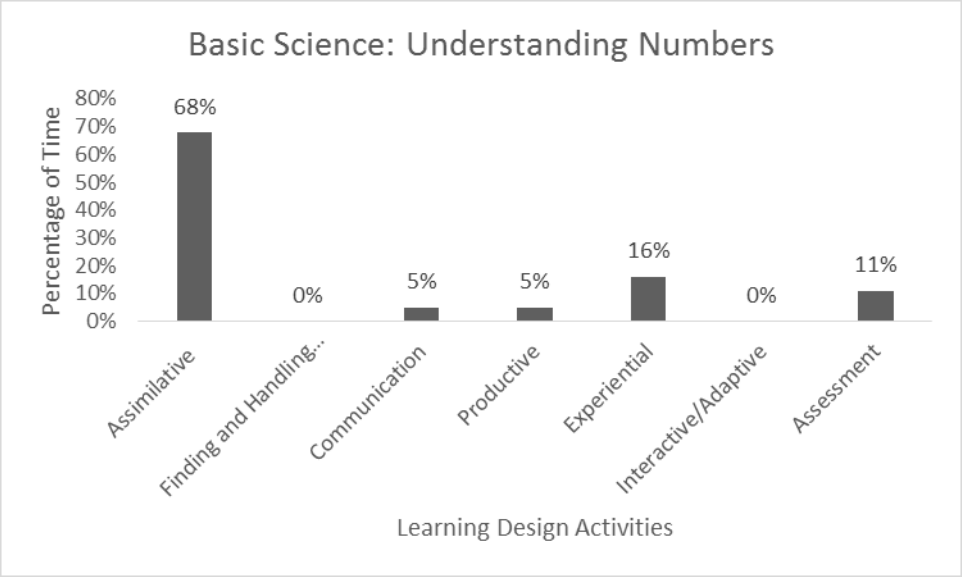

Figure 3: Learning Design for Basic Science: Understanding Numbers

Compared to the course's Basic Science: Understanding Experiments counterpart, Understanding Numbers is higher in assimilative activities, lower in communication and experiential activities and higher in assessment.

Table 3: Performance Dashboards for Basic Science: Understanding Numbers

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	6,172	2,904	2,609	2,618
Active Learners	5,021 (81.35%)	2,219 (76.41%)	1,866 (71.52%)	1,699 (64.90%)
Returning Learners	3,094 (50.13%)	1,151 (39.63%)	914 (35.03%)	764 (29.18%)

In comparison to Understanding Experiments, Understanding Numbers performed better for both Active and Returning Learners in terms of percentages in Presentations 2 to 4. This may be due to the difference in learning design in Understanding Numbers in comparison to Understanding Experiments.

4.1.6 Challenging Wealth and Income Inequality

Challenging Wealth and Income Inequality had four complete presentations from production to January 2017. The course is four weeks in length, comprising 105 steps, with a recommended study time of three hours per week, totalling 12 hours of study for completion. The course initially ran, for its first presentation, with the title Inequalities in Personal Finance: The Baby Boom Legacy, but was changed to its current title as it was felt that this did not accurately represent the content of the course.

The course explores the topic of rising inequalities in wealth and income in developed countries across the globe, reviewing the opportunities that the baby boom generation had in terms of housing and pensions and the implications of this on the wealth and income of subsequent generations.

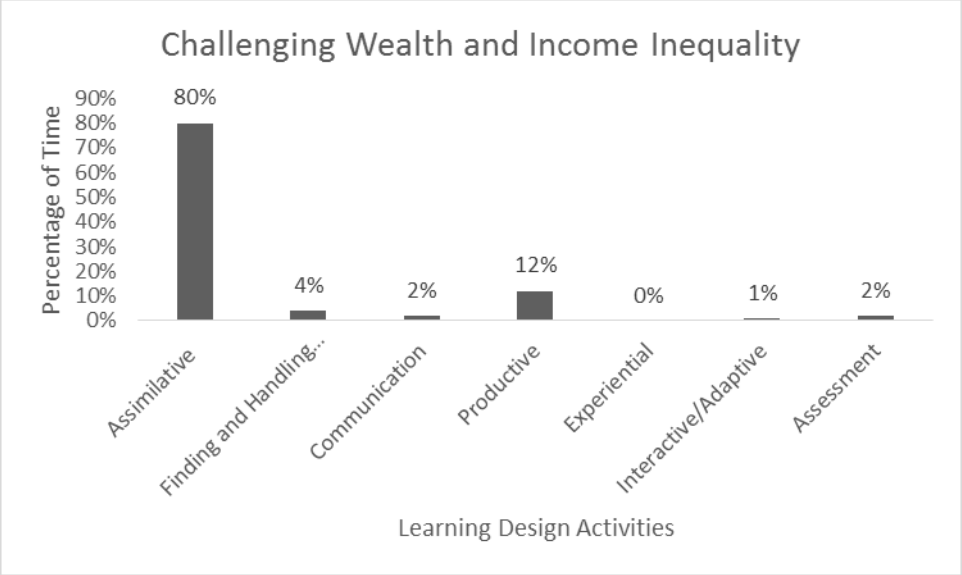

Figure 4: Learning Design for Challenging Wealth and Income Inequality

Though this course features predominantly assimilative activities, there is a high percentage of productive activities in comparison to communication steps, which is unusual as communication is normally secondary to assimilative in MOOCs produced by the OU. For example, learners have to contribute to the course with information from personal experiences relating to inequalities in

personal finance, and though this may be actioned through a discussion step, the learning design activity is also classified as productive.

Table 4: Performance Dashboards for Challenging Wealth and Income Inequality

	Presentation 1	Presentation 2	Presentation 3	Presentation 4
Learners	1,959	2,764	2,642	1,205
Active Learners	1,580 (80.65%)	2,033 (73.55%)	1,576 (59.65%)	874 (72.53%)
Returning Learners	977 (49.87%)	1,021 (36.93%)	708 (26.80%)	363 (30.12%)

In reviewing the performance dashboards there is a decline in both Active and Returning Learners in Presentations 2 and 3 in comparison to the first presentation. Though a decline is expected from the second presentation onwards when comparing performance data of OU MOOCs, the decline from Presentation 1 to Presentation 3 is substantial with a difference of 21.00 and 23.07 percentage points for Active and Returning Learners respectively. However, there is an increase from Presentation 3 to Presentation 4. As this increase is a single occurrence it may not be due to the learning design but to previously mentioned mitigating external events.

4.1.7 Childhood in the Digital Age

Childhood in the Digital Age had six complete presentations from production to January 2017. The course is four weeks in length, comprising 105 steps, with a recommended study time of three hours per week, totalling 12 hours of study for completion. The initial three presentations ran concurrently, with the latter three evenly spaced throughout the subsequent time period.

The course focusses on the issues faced in the modern world with children having access to digital devices and building relationships through social media, the evolution of the classroom environment and how these may be shaping children's development and future.

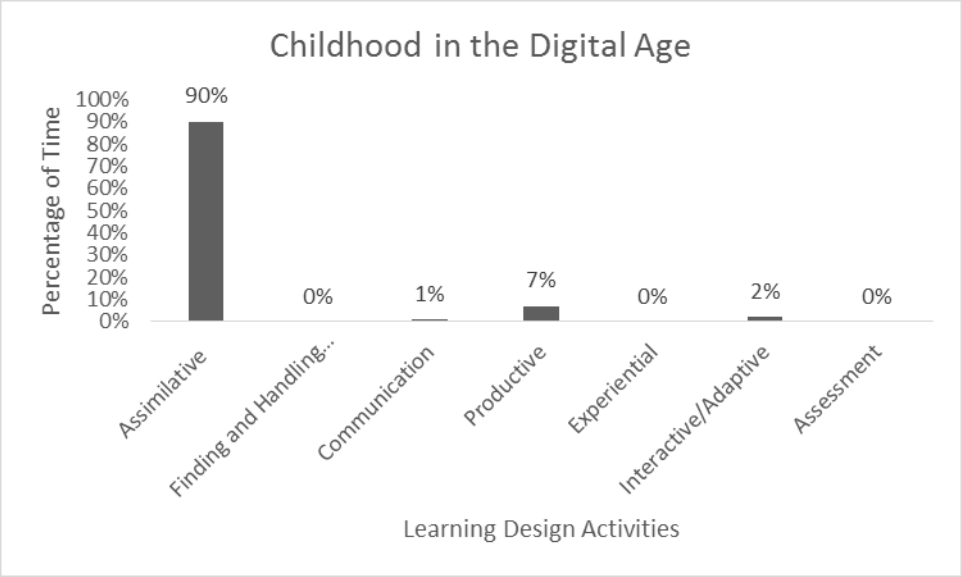

Figure 5: Learning Design for Childhood in the Digital Age

Childhood in the Digital Age is one of the few courses developed and launched by the OU with no assessment, as it was felt that it did not pedagogically suit the learning design of the course. Instead the course has a high volume of assimilative steps with articles and videos. In the productive and interactive/adaptive steps learners are encouraged to take part in polls and learning exercises.

Table 5: Performance Dashboards for Childhood in the Digital Age

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**	**Presentation 5**	**Presentation 6**
Learners	5,409	2,812	2,131	3,303	2,168	2,656
Active Learners	4,296 (79.42%)	2,135 (75.92%)	1,705 (80.01%)	2,543 (76.99%)	1,723 (79.47%)	1,880 (70.78%)
Returning Learners	1,957 (36.18%)	963 (34.25%)	832 (39.04%)	1,249 (37.81%)	810 (37.36%)	857 (32.27%)

Though the course is exceptionally high in assimilative activities, the level at which the learners engaged remained fairly stable with only a 9.23 percentage point differential in Active Learners from the highest recorded in Presentation 3 (80.01 percent) and the lowest in Presentation 6 (70.78

percent). With Returning Learners the highest recorded was also in Presentation 3 (39.04 percent) and the lowest was in Presentation 6 (32.27 percent) with a differential of 6.77 percent. This demonstrates that, though the number of learners varied across the presentations, the number of Active Learners and Returning Learners did not show a significant difference.

4.1.8 Elements of Renewable Energy

Elements of Renewable Energy had six complete presentations from production to January 2017. The course is four weeks in length, comprising 68 steps, with a recommended study time of three hours per week, totalling 12 hours of study for completion.

This course developed a learning design around the four elements (wind, fire, earth and water) and presents a different element for each of the four weeks, with learners developing their knowledge of renewable energy technologies and their environmental impact in comparison to fossil fuels.

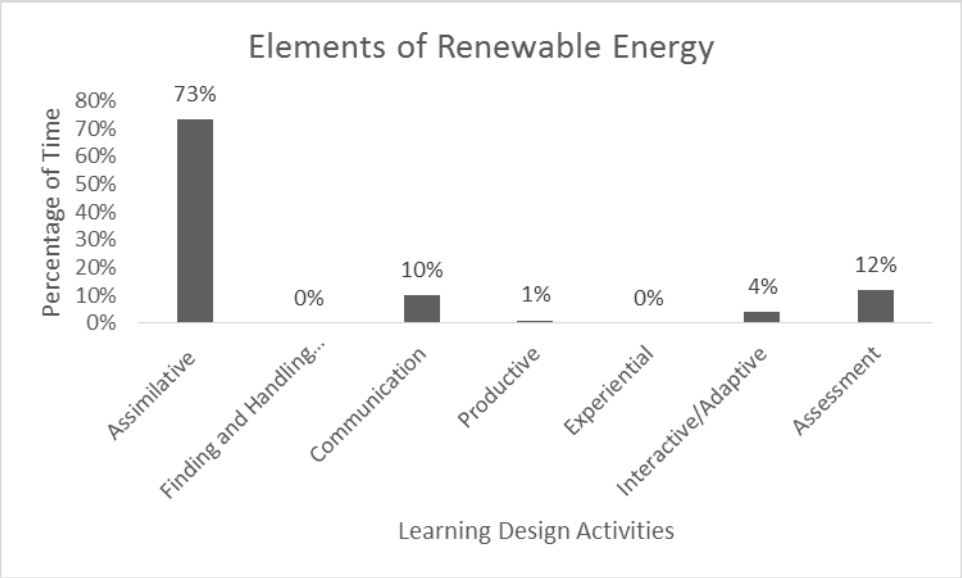

Figure 2: Learning Design for Elements of Renewable Energy

In comparison to the majority of the MOOCs reviewed as part of this research, Elements of Renewable Energy has a high percentage of assessment with a combination of quizzes and tests throughout the course. Within the course the learners have the opportunity to take part in an

activity called Power in your Postcode which requires them to learn with an interactive step how many houses in their postcode could be powered by renewable energy and discuss their individual findings with other learners in the discussion steps.

Table 6: Performance Dashboards for Elements of Renewable Energy

	Presentation 1	Presentation 2	Presentation 3	Presentation 4
Learners	3,668	4,145	2,593	1,728
Active Learners	2,998 (81.73%)	3,256 (78.55%)	1,977 (76.24%)	1,358 (78.58%)
Returning Learners	1,929 (52.58%)	1,887 (45.52%)	1,129 (43.54%)	752 (43.51%)

The rate at which learners engaged with the course as Active and Returning Learners remained fairly stable with a 3.15 percent differential in Active Learners from Presentation 1 to Presentation 4 and a 9.07 percent differential in comparison to the same presentations for Returning Learners, even though there was a 47.11 percent decline in Learners. This demonstrates that, though the course had a reduction in Learners initially accessing the course, the percentages of Active and Returning Learners are similar regardless of the number of Learners accessing the course.

4.1.9 Forensic Psychology: Witness Investigation

Forensic Psychology: Witness Investigation had four complete presentations from production to January 2017. The course is eight weeks in length, comprising 150 steps, with a recommended study time of three hours per week, totalling 24 hours of study for completion, and is released week by week as part of the learning design narrative.

In this MOOC learners are presented with evidence of a crime and use the clues left throughout the course to develop their cognitive skills to help to solve the mystery alongside two police inspectors.

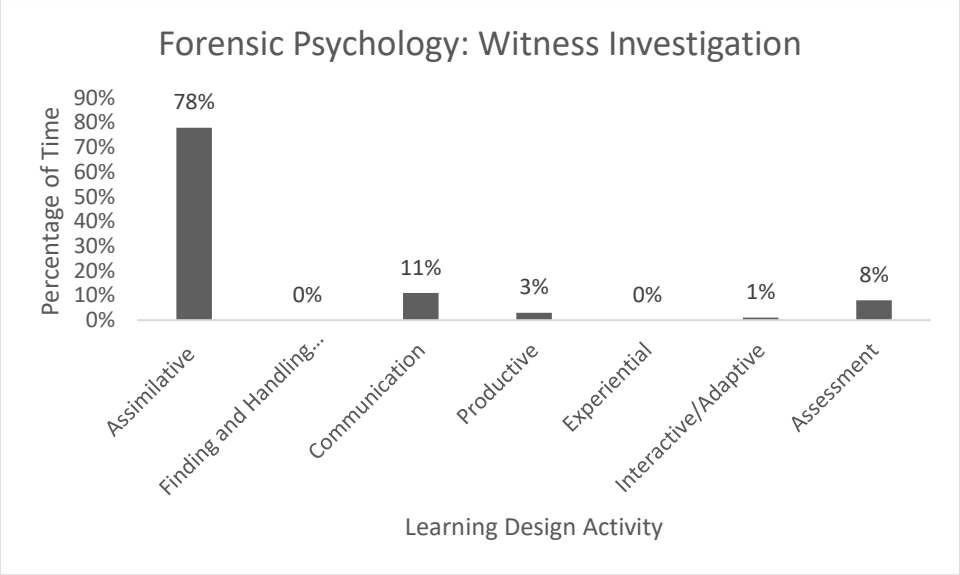

Figure 3: Learning Design for Forensic Psychology: Witness Investigation

Forensic Psychology: Witness Investigation is based on a narrative learning design whereby the content is released manually week by week preventing the learners from progressing at different paces to solve the crime committed in Week 1. This is a notable element of the learning design that cannot be reflected in Figure 7 above. Within the course learners are presented with assimilative steps in the form of clues as to the perpetrators of the crime and follow two police inspectors as they attempt to solve the mystery using the discussion, productive and interactive/adaptive steps to post about their findings and theories. At the end of each week there is a quiz followed by a 'cliff hanger' step that provides a clue to the following week.

Table 7: Performance Dashboards for Forensic Psychology: Witness Investigation

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	10,708	7,903	7,415	7,896
Active Learners	9,663 (90.24%)	6,851 (86.69%)	6,156 (83.02%)	6,698 (84.83%)
Returning Learners	6,067 (56.66%)	3,802 (48.11%)	3,080 (41.54%)	3,515 (44.52%)

As with all courses reviewed as part of this research there is a decline from the first to subsequent presentations in terms of performance. However, Forensic Psychology: Witness Investigation maintains continuing high levels of engagement in terms of Active and Returning Learners (Pike and Gore, forthcoming), which may be due to its learning design having a weekly release of the content in keeping with the narrative, and the use of 'cliffhangers'.

4.1.10 From Notation to Performance: Following a Musical Score

From Notation to Performance: Following a Musical Score is four weeks in length, with three hours of study time recommended per week, comprising 62 steps, and ran for three complete presentations from production to January 2017. The course provides a general introduction in understanding a musical score, which professionals use the notations contained within, and how this affects rehearsals and performances.

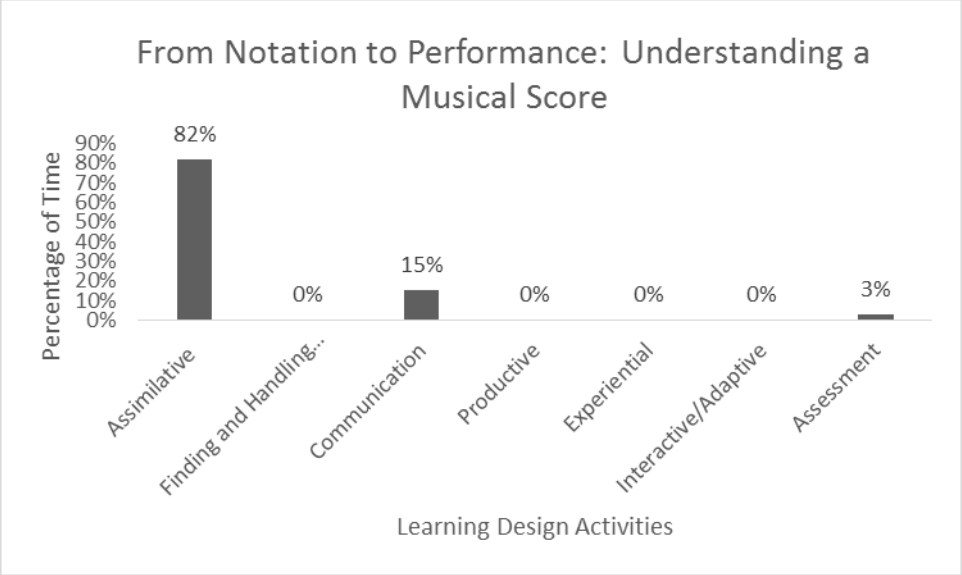

Figure 4: Learning Design for From Notation to Performance: Understanding a Musical Score

This course has a high level of videos (17) within its four weeks of material due to the nature of the content. The course also only provides two quizzes in Weeks 2 and 4 to assess the level of learning achieved. There are nine discussion activities within the course with five in Week 1, three in Week 2 and one in Week 3. There are no discussion activities in Week 4.

Table 8: Performance Dashboards for From Notation to Performance: Following a Musical Score

	Presentation 1	Presentation 2	Presentation 3
Learners	3,419	2,956	1,782
Active Learners	2,013 (58.88%)	1,615 (54.63%)	850 (47.70%)
Returning Learners	1,855 (54.26%)	1,485 (50.24%)	744 (41.75%)

This course is one of the lowest performing in terms of engagement of the MOOCs within this study. It is possible for a course to have a low number of learners but retain a high level of engagement marked through Active and Returning Learners, as demonstrated with Childhood in the Digital Age (Table 5).

4.1.11 Get Started with Online Learning

Get Started with Online Learning is two weeks in length, with three hours of study per week, comprising 36 steps, and is designed to introduce learners to the elements of online learning, giving an insight into the skills required for studying online and how learners can self-reflect in evaluating their own skill set. The course also explores how students develop online communities and benefit from flexibility in their study arrangements. The course gives insight into the teaching methods at the OU to help learners to consider alternative options to campus universities. This course presented five times from production to January 2017.

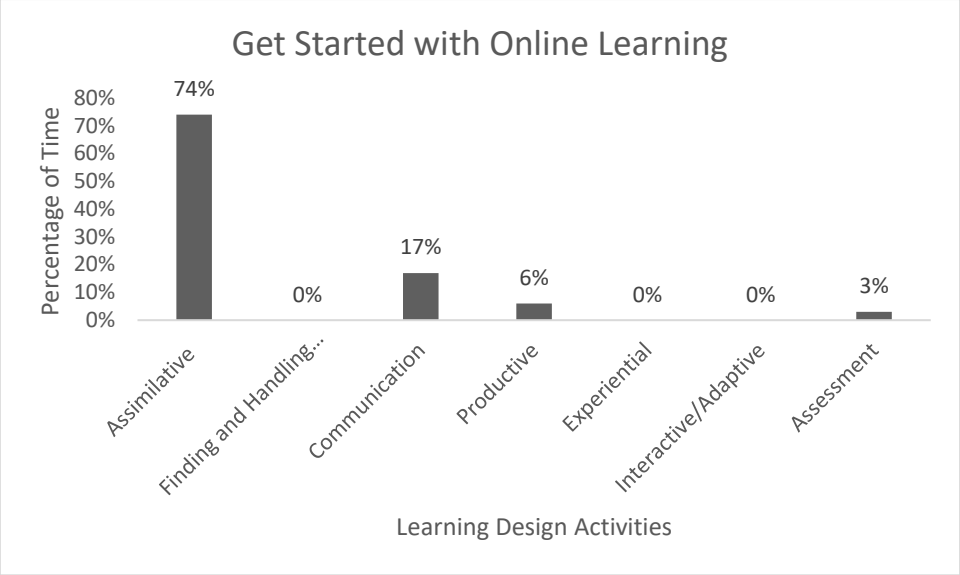

Figure 5: Learning Design for Get Started with Online Learning

The course consists of 25 steps in which learners could attempt a quiz, six discussions and two exercise activities in the form of a reflection activity to define how long learners spend online undertaking certain activities and a poll (classified as productive due to learners contributing information). The remainder of the course is made up of videos and articles.

Table 9: Performance Dashboards for Get Started with Online Learning

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**	**Presentation 5**
Learners	4,285	2,836	1,295	1,825	1,423
Active Learners	3,544 (82.71%)	2,231 (78.67%)	1,019 (78.69%)	1,443 (79.07%)	967 (67.96%)
Returning Learners	1,618 (37.76%)	884 (31.17%)	437 (33.75%)	607 (33.26%)	349 (24.53%)

From Presentation 1 to Presentation 5, Get Started with Online Learning had the largest fall in engagement in terms of Active Learners (14.7 point differential in percentage) and Returning Learners (13.23 point differential in percentage). This may be due to critical mass being required for

the high number of discussions within the two-week course, as when there was an increase in Learners in Presentation 4 there was an increase in engagement with Active and Returning Learners.

4.1.12 Introduction to Cyber Security

Introduction to Cyber Security is an eight-week course, with three hours of study time recommended per week, comprising 153 steps, with eight complete presentations from production to January 2017 (the highest number of presentations of the MOOCs reviewed).

The course is designed to give learners an understanding of online security, with tips on how to protect their digital life both at home and at work to recognise threats and how to prevent such threats in future. The course introduces learners to wider aspects including malware, viruses, Trojans, cryptography, network security, risk management and identity theft.

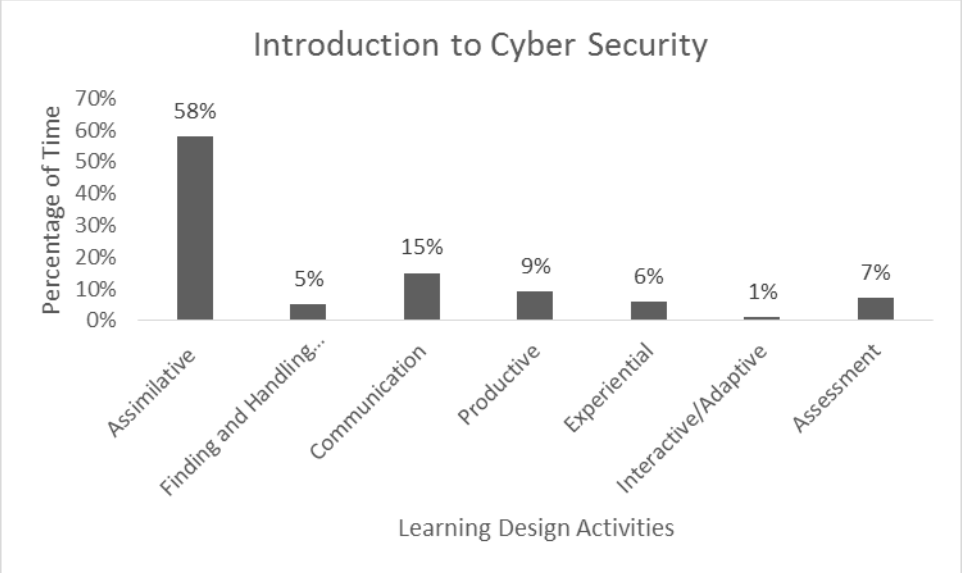

Figure 6: Learning Design for Introduction to Cyber Security

Introduction to Cyber Security is the most balanced course within the MOOCs reviewed for this research as all of the learning design activities, with the full spectrum of the taxonomy, are utilised. In terms of assessment, unlike most of the courses being reviewed, Introduction to Cyber Security utilises only tests in terms of assessment which are summative, whilst quizzes are formative. Within

the course learners are expected to be self-reflective of their existing and newly acquired knowledge, gather information and statistics from external resources for discussion within the course and test their abilities through exercises such as password strength checkers.

Table 10: Performance Dashboards for Introduction to Cyber Security

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	15,513	12,791	8,514	7,613
Active Learners	13,310 (85.80%)	10,515 (82.21%)	6,729 (79.04%)	5,591 (73.44%)
Returning Learners	8,575 (55.28%)	6,418 (50.18%)	3,814 (44.80%)	3,035 (39.87%)
	Presentation 5	**Presentation 6**	**Presentation 7**	**Presentation 8**
Learners	10,145	10,764	7,954	7,695
Active Learners	7,300 (71.96%)	8,163 (75.84%)	6,094 (76.62%)	5,800 (75.37%)
Returning Learners	3,809 (37.55%)	3,184 (29.58%)	4,591 (57.72%)	3,149 (40.92%)

Though Introduction to Cyber Security had the highest number of presentations of the 19 MOOCs reviewed for this research, it did not sustain the largest differential in terms of Active Learners from the first to the last presentation reviewed. There was an increase in Learners in Presentations 5 and 6 due to external events in the media involving the communications company TalkTalk (BBC, 2015). However, once this subsided the number of Learners returned to its previous gradual decline (Gore, 2015). This demonstrates that factors external to the learning design can impact on engagement and Joiners becoming Learners. The media event peaked during Presentation 6 which may help to explain why the percentage of Active Learners was higher than the previous two presentations, but the percentage of Returning Learners was the lowest recorded across all presentations (the culprits

had been detained and therefore the learners may have felt safe again so did not pursue the course further).

4.1.13 In the Night Sky: Orion

In the Night Sky: Orion is a four-week course, comprising 101 steps, with three hours of study time recommended per week, covering the basics of astronomy and stargazing, how stars are born and the stories and legends behind the constellation Orion. The course explores the stars that make up the constellation with images from the Hubble Space Telescope, and how the constellation is positioned within the galaxy.

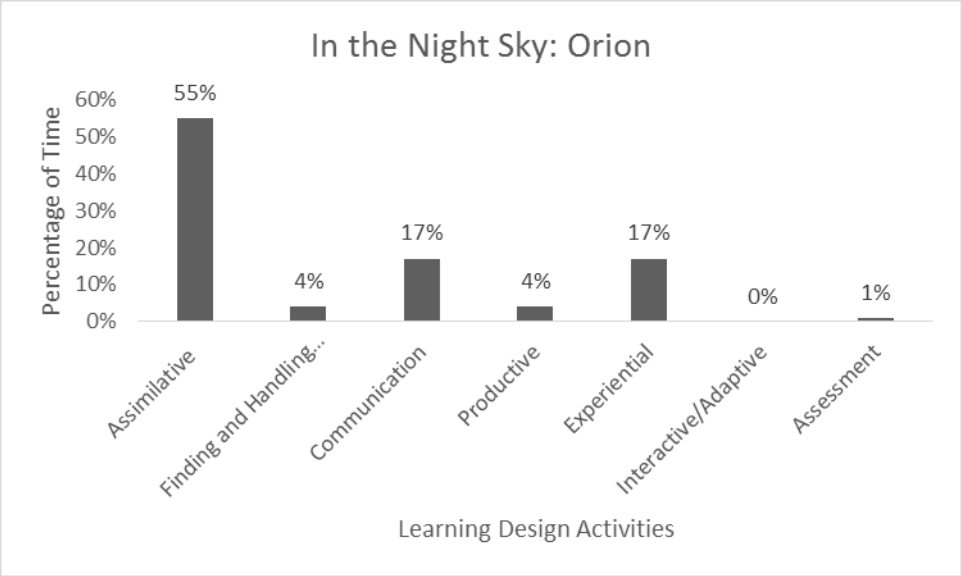

Figure 7: Learning Design for In the Night Sky: Orion

In this course learners are expected to undertake activities for contribution to the MOOC and subsequent discussions. Learners share photos of Orion taken with phones and cameras either as seen with the naked eye or through a telescope. Learners also develop their own constellations, designing the layout of the stars, the name given and the story of the constellation. The course also includes short formative quizzes and a summative test at the end.

Table 11: Performance Dashboards for In the Night Sky: Orion

	Presentation 1	Presentation 2
Learners	9,184	7,784
Active Learners	8,317 (90.55%)	6,649 (85.41%)
Returning Learners	5,704 (62.11%)	3,911 (50.24%)

There have only been two presentations of In the Night Sky: Orion due to the timings in the year that Orion is most visible in the night sky. Even though there was a 15.25 percent reduction in Learners from Presentation 1 to Presentation 2, there was only a 5.14 point differential in percentage in Active Learners and an 11.84 point differential in percentage in Returning Learners from the first to the second presentation. This means that the decline of engagement with Returning Learners was far greater than that with Active Learners.

4.1.14 Managing My Investments

Managing My Investments ran for three presentations as a six-week course, comprising 165 steps, with three hours per week recommended study time. The course covers aspects of different investment choices and the risks and returns associated with each, allowing learners to safely explore the practicalities of involvement in personal finance markets. The course gives learners insight into the individual and group behavioural traits that give rise to ineffective investment decision making. The course utilises case studies to aid learner understanding in demonstrating how ideas and issues of personal investments can be explored.

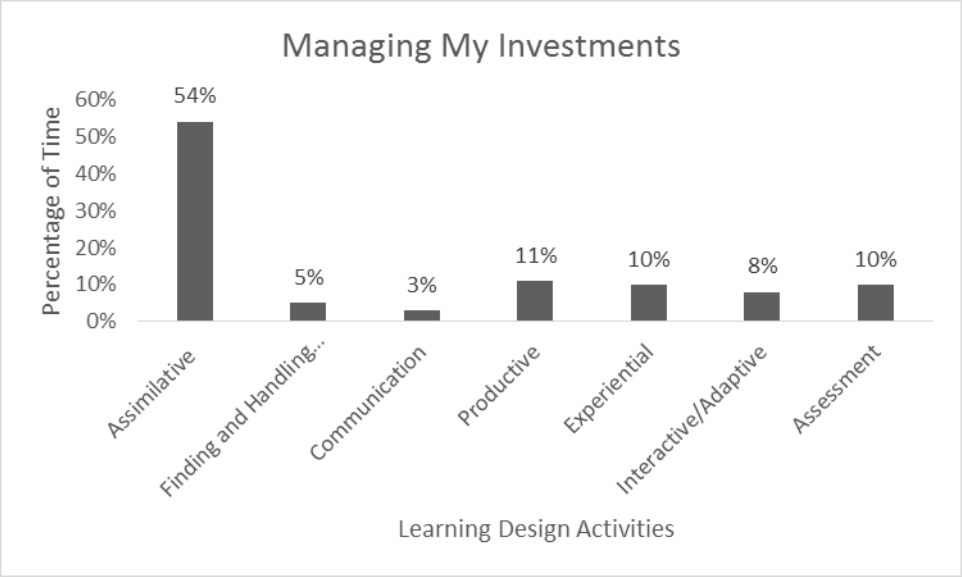

Figure 8: Learning Design for Managing My Investments

This is one of the few courses reviewed that integrates audio as well as video assets within the assimilative steps of the MOOC. In the course learners are expected to access information and data external to the course about investment opportunities that are available to them, and consider the viability of these options as part of self-reflection and discussion. The course is lengthy in terms of steps with 164 in total including three formative quizzes and six summative tests.

Table 12: Performance Dashboards for Managing My Investments

	Presentation 1	**Presentation 2**	**Presentation 3**
Learners	10,846	7,044	3,249
Active Learners	7,677 (70.78%)	5,644 (80.12%)	2,482 (76.39%)
Returning Learners	3,744 (34.52%)	2,952 (41.91%)	1,194 (36.75%)

Managing My Investments is the only course in the MOOCs reviewed for this research that increased in engagement for Active and Returning Learners for the first and last presentations even though the

overall number of Learners had decreased. The second presentation took place in January 2016 which was specifically selected to target learners who may have made financial New Year's resolutions which may possibly explain the increase in engagement within the course in terms of Active and Returning Learners.

4.1.15 Managing My Money

Managing My Money is an eight-week course, comprising 178 steps, with a recommended study time of three hours per week, which presented four times from production to January 2017. The course develops learner understanding of how to compile budgets and use budget tools in decision making about expenditure, and gives insights into mortgages, pensions and insurance, providing tools for learners to create transferable skills.

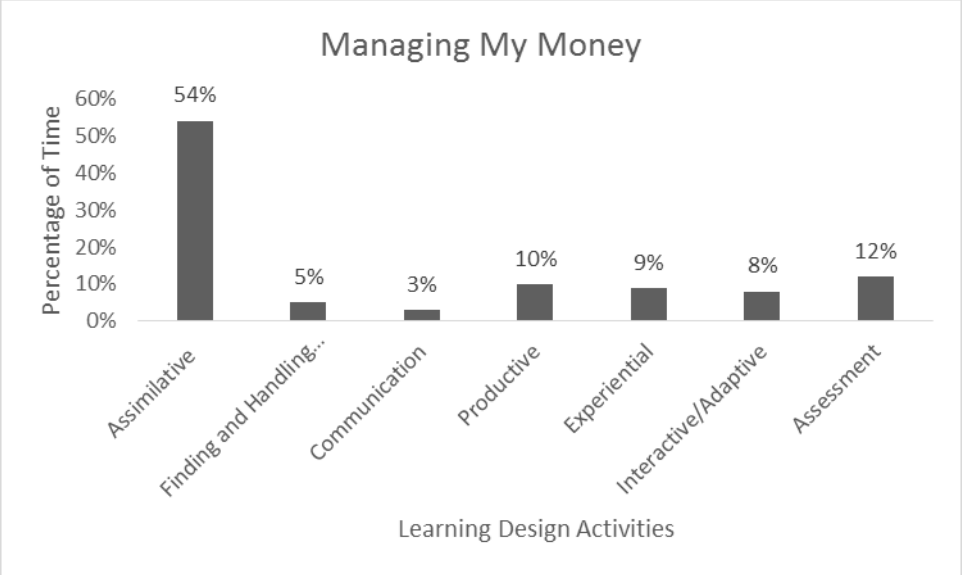

Figure 9: Learning Design for Managing My Money

As with Managing My Investments, Managing My Money (written by the same academic) has a balance of learning design activities. This course is two weeks longer than its Managing My Investments counterpart but only has 12 more steps in total (176). This course also has a requirement for learners to access external information (finding and handling information) to assimilate for self-reflection (assimilative) and discussion (communication) within the course

discussion steps. Learners are also expected to develop budget sheets (productive) and measure their financial scores (interactive/adaptive). At the end of the course there is an opportunity for learners to reflect on the knowledge that they have gained and been assessed on through formative quizzes and summative tests.

Table 13: Performance Dashboards for Managing My Money

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	9,817	11,124	6,345	3,999
Active Learners	7,715 (78.59%)	8,386 (75.39%)	4,497 (70.87%)	3,143 (78.59%)
Returning Learners	4,309 (43.89%)	4,475 (40.23%)	2,041 (32.17%)	1,511 (37.78%)

As with Managing My Investments, the second presentation of Managing My Money was scheduled for January (2015) to capitalise on learner's New Year's resolutions. This is the only course reviewed in which, though there was a reduction in Learners from the first to the last presentation reviewed, the percentage of Active Learners is identical. As expected, as with the majority of the other MOOCs, there is a reduction in Returning Learners with a 6.11 point differential in percentage.

4.1.16 Smart Cities

Smart Cities is a six-week course, comprising 112 steps, with a recommended study time of three hours per week, which ran four complete presentations from production to January 2017. The course allows learners to navigate through the emergence of the concept of smart cities, and how innovations by entrepreneurs, communities, businesses and city leaders are developing cities across the globe, covering subjects and issues related to open data, crowdsourcing, privacy, ethics and security. The course culminates in the co-creation of a smart city project where learners live.

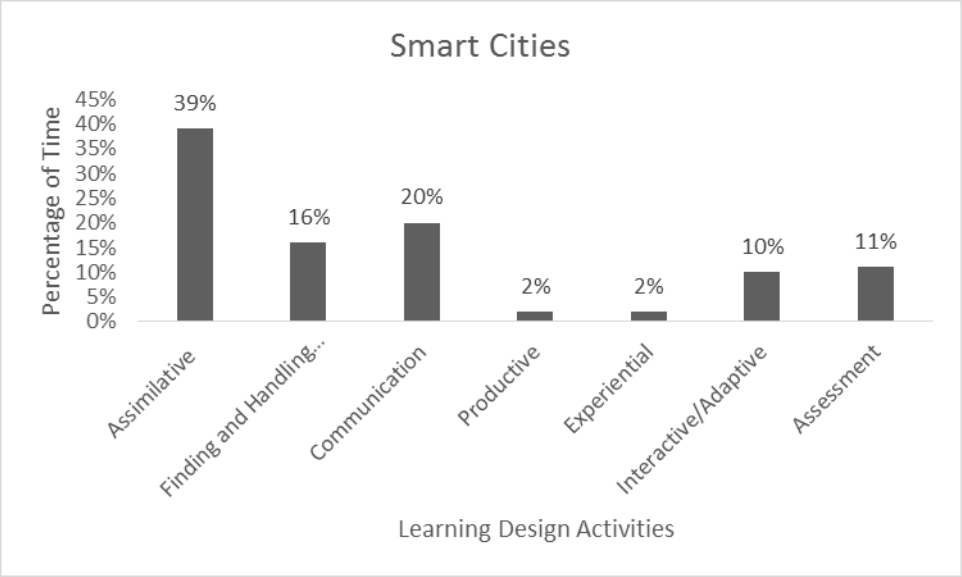

Figure 10: Learning Design for Smart Cities

This course is one of two MOOCs that have the lowest percentage in terms of assimilative activities. In this course learners are part of a large-scale citizen science project to gather and record data on the infrastructure and technology being used in their towns and cities. From this data, learners explore opportunities and partake in discussions with learners in different towns and cities to share ideas as to how to develop smarter cities in the future.

Table 14: Performance Dashboards for Smart Cities

	Presentation 1	**Presentation 2**	**Presentation 3**	**Presentation 4**
Learners	3,692	3,070	2,629	1,744
Active Learners	2,568 (69.56%)	2,125 (69.21%)	1,739 (66.14%)	1,212 (69.50%)
Returning Learners	1,224 (33.15%)	1,014 (33.03%)	806 (30.66%)	556 (31.88%)

As with a number of courses reviewed there is a reduction in Learners from the first and last presentations examined. However, with regards to Active Learners, with the exception of

Presentation 3, there is a maximum of a 0.35 point differential in percentage within the three remaining presentations. In evaluating Returning Learners there is a maximum of a 2.49 point differential in percentage, meaning that in terms of engagement, though there was a 47.24 point reduction in percentage in Learners from Presentation 1 to 4, the engagement levels within the course were fairly stable.

4.1.17 Start Writing Fiction

Start Writing Fiction is an eight-week course, comprising 123 steps, with a recommended study time of three hours per week, which focusses on the development of learners' skills with regards to character creation. The learners are presented with guidance from a range of authors giving insight into the tools and methods they use to write and the usefulness of journal keeping. Through the course learners are expected to develop a character or characters using the weeks to reflect on and edit their work to develop the characters into plotlines.

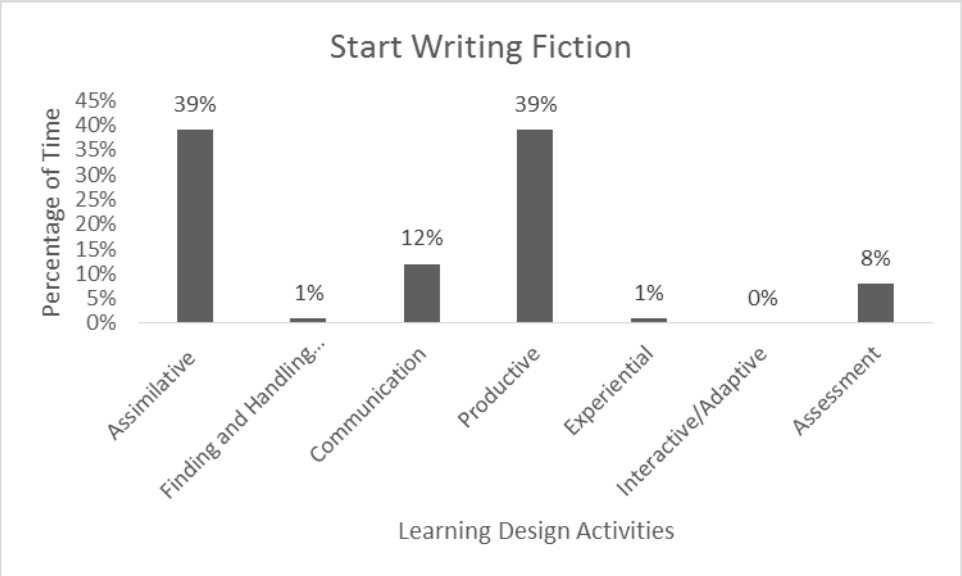

Figure 11: Learning Design for Start Writing Fiction

Due to the purpose of the course being the creation of characters, the learning design is focussed on productive learning activities, with the learners developing content and ideas, and keeping a writing

journal. The assessment activities in this course, unlike with other MOOCs, are not quizzes and tests, but peer review whereby learners can submit their writing for feedback from other learners.

Table 15: Performance Dashboards for Start Writing Fiction

	Presentation 1	Presentation 2	Presentation 3	Presentation 4	Presentation 5	Presentation 6
Learners	16,181	14,201	13,699	14,441	12,967	9,943
Active Learners	14,837 (91.69%)	12,594 (88.68%)	11,894 (86.82%)	12,444 (86.17%)	11,195 (86.33%)	8,665 (87.15%)
Returning Learners	7,731 (47.78%)	6,300 (44.36%)	5,394 (39.38%)	5,394 (37.35%)	4,945 (38.14%)	3,789 (38.11%)

Though there is a 38.56 point reduction in percentage in Learners from Presentation 1 and Presentation 6, there is only a 4.54 point differential in percentage in Active Learners when comparing the same presentations. Returning Learners are lower than on other courses reviewed within this research but that may be due to the continual writing and development elements of the course, whereby the learning journey through the course is very linear, requiring learners to complete activities in previous weeks to progress through to the future weeks.

4.1.18 The Business of Film

The Business of Film was created by the OU in association with Pinewood Studios as a six-week course, comprising 96 steps, with three hours per week recommended study time. The purpose of the course is to give learners an understanding of the value chain concept, utilising independent film case studies to aid learners to explore key business decisions that need to be made when producing a film. The course also covers aspects of intellectual property, copyright, public funding, marketing and box office returns.

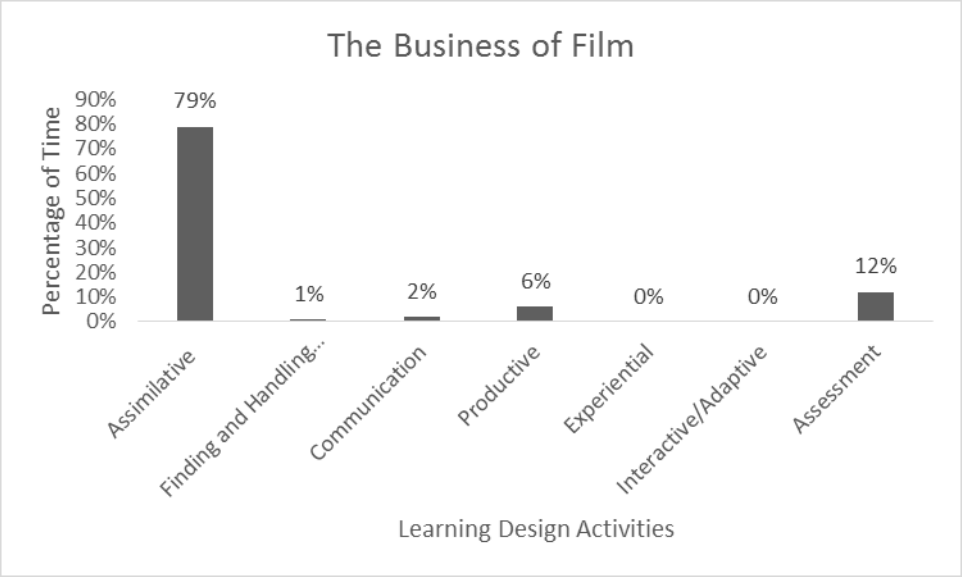

Figure 12: Learning Design for The Business of Film

The course mainly comprises article and video steps due to the number of case studies that the MOOC contains. In the course the learners are expected to find information on the financial aspects of film-making to use within discussions to produce further findings and understanding. The course also provides one formative quiz and six summative tests for the learners to assess their knowledge.

Table 16: Performance Dashboards for The Business of Film

	Presentation 1	**Presentation 2**
Learners	4,156	2,698
Active Learners	3,084 (74.21%)	1,969 (72.98%)
Returning Learners	1,418 (34.12%)	847 (31.39%)

As with other courses there is a reduction in Learners from the first to the last presentations, but The Business of Film is fairly consistent in terms of performance for Active and Returning Learners.

4.1.19 The Lottery of Birth

The Lottery of Birth was designed to be a data-driven course of four weeks, comprising 85 steps, with a recommended study time of three hours per week, in which learners examine the inequalities of birth, and the lottery of being born in different parts of the world as rich or poor and being born male or female. The course also gives insight into how individual countries and global organisations respond to demographic changes and how they are predicting these changes in the future. The course brings together social and political discussion based on demography and economic data. At the end of the course learners have the opportunity to critically analyse initiatives and review other learners' analysis through peer review activity.

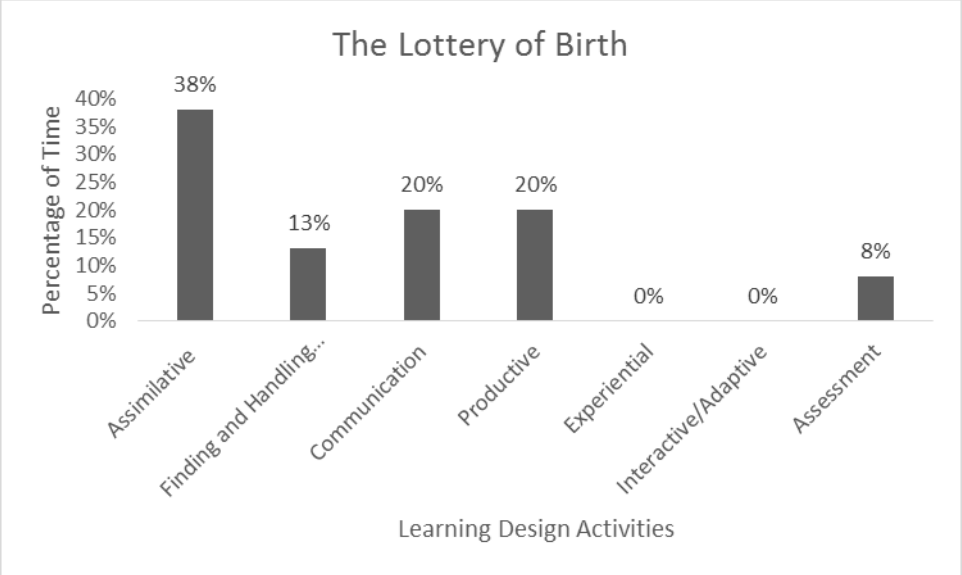

Figure 13: Learning Design for The Lottery of Birth

As this course is based on data in the form of collection and analysis for discussion, learners are required to locate information from specific sites online and to disseminate and discuss this in the communication steps. The assessment of the course is prescribed through one formative quiz and a peer review activity in Week 4 whereby learners are expected to review media coverage in relation to aspects of the course and to reflect upon why this portrayal is relevant. Learners are then

expected to submit their reflections into the peer review system and, as a result, review other learners' submissions to have feedback on theirs returned.

Table 17: Performance Dashboards for The Lottery of Birth

	Presentation 1	Presentation 2	Presentation 3
Learners	2,807	1,318	2,226
Active Learners	2,318 (82.58%)	1,026 (77.84%)	1,819 (81.72%)
Returning Learners	1,255 (44.71%)	477 (36.19%)	937 (42.09%)

Though the course has a high percentage of finding and handling and productive learning design activities, in addition to a peer review activity, this does not seem to have a significant negative impact on the Active and Returning Learners (as with other courses in this study using peer review) as, with the exception of Presentation 2, the percentages are fairly stable with only a 0.86 and a 2.62 point differential in percentage respectively for the first and last presentations.

4.1.20 The Science of Nuclear Energy

The Science of Nuclear energy is designed to give learners an introduction to fission, fusion and the political agenda around nuclear energy. The four-week course, comprising 94 steps, with three hours per week recommended study time, gives insight into the sustainability and carbon footprint of using nuclear energy to produce electricity, but also the economic viability, potential dangers of use and public perception of nuclear energy. The course also includes the issues being faced in the United Kingdom with the decommissioning of current nuclear reactors by 2023 and the potential 'energy gap' it could create.

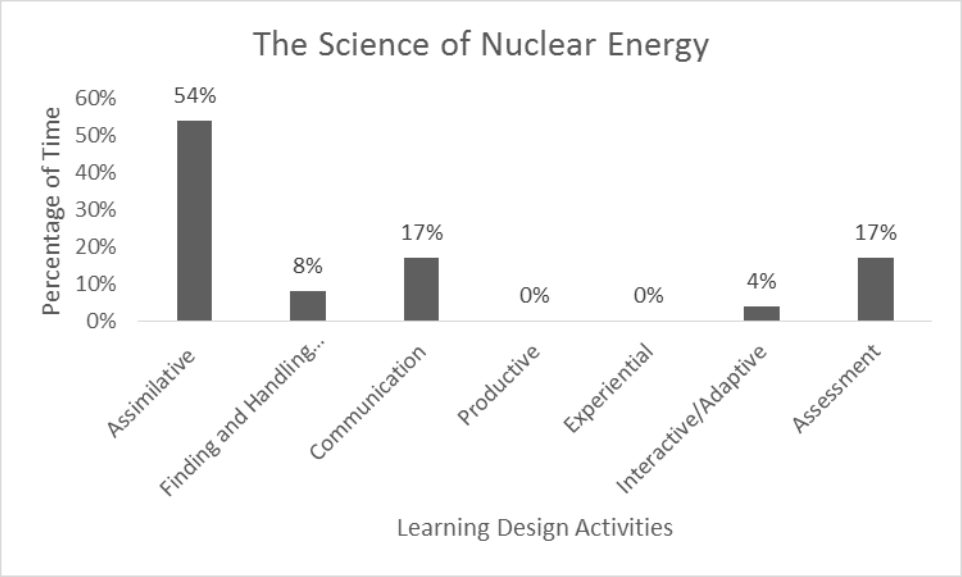

Figure 14: Learning Designs for The Science of Nuclear Energy

Within the course learners are expected to locate information on nuclear energy provisions and partake in interactive exercises to develop knowledge to disseminate into the discussion steps. There are a number of 'stop and check' formative quizzes mid-week within the course for learners to recap and to assess whether they understand the content before progressing to the final summative test at the end of the course.

Table 18: Performance Dashboards for The Science of Nuclear Energy

	Presentation 1	**Presentation 2**	**Presentation 3**
Learners	2,988	2,628	1,262
Active Learners	2,557 (85.58%)	2,201 (83.75%)	965 (76.46%)
Returning Learners	1,585 (53.05%)	1,221 (46.08%)	525 (41.60%)

Due to the nature of the course attracting both pro- and anti-nuclear supporters, this may have aided with the engagement of learners in the discussions within both the communication and

assimilative steps. However, overall there was a 9.12 point differential in percentage in Active Learners from Presentation 1 to Presentation 3 and an 11.45 point differential in percentage in Returning Learners.

4.1.21 The Science of Nutrition

The Science of Nutrition delves into aspects of the chemistry, physics and biology of nutrition and components of food in a four-week course, comprising 95 steps, with a recommended study time of three hours per week. Learners are given information as to how to understand complex food labelling and consider how these foods are processed by the body.

The course progresses to understanding elements of human biology, concentrating on the digestive system, including how food affects the bloodstream and liver, which processes the nutrients. Within the course learners are expected to conduct experiments to understand more about the role that enzymes and acid play in digestion, and the energy within a signal peanut. In the final week learners consider what constitutes a healthy diet and the impact of overconsumption leading to the obesity epidemic, the impact of which is witnessed in many countries globally.

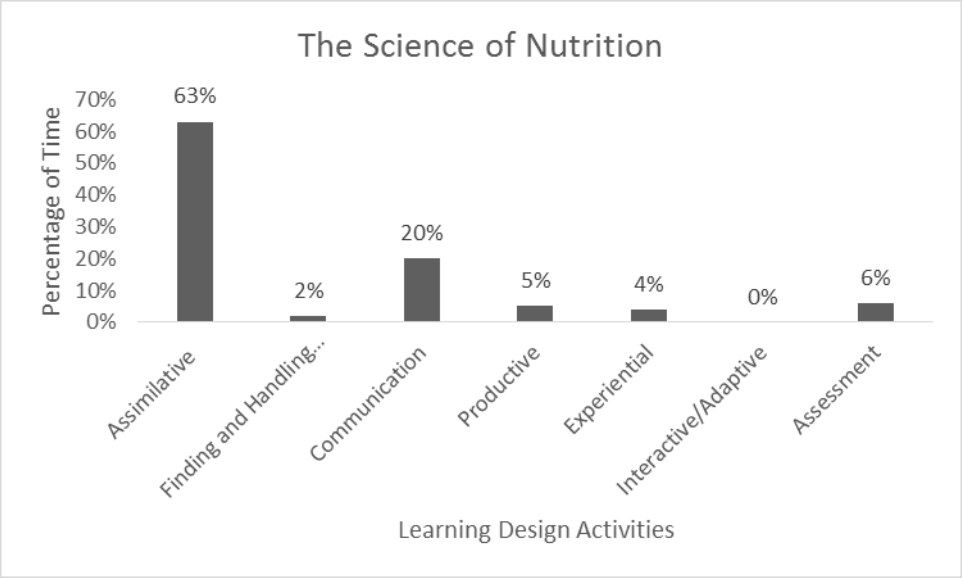

Figure 15: Learning Design for The Science of Nutrition

In this course learners are expected to undertake a number of activities to locate information online about nutrition and its effects, produce lists of the countries with the highest numbers of obese people based on externally located data, play against the computer in 'Snack Top Trumps' to learn about the nutritional content of foods, and to conduct experiments. There are 17 dedicated discussion steps within the course, with eight of them in Week 3. Learners are also able to partake in five formative quizzes and a summative test at the end of the course.

Table 19: Performance Dashboards for The Science of Nutrition

	Presentation 1	**Presentation 2**	**Presentation 3**
Learners	8,907	9,689	7,885
Active Learners	7,678 (86.20%)	8,230 (84.94%)	6,838 (86.72%)
Returning Learners	4,346 (48.79%)	4,585 (47.32%)	3,571 (45.29%)

The engagement within The Science of Nutrition is consistent across all presentations and did not see an increase in engagement in Presentation 2 which was scheduled for January 2016 to coincide with learners' New Year's resolutions. There was a slight increase in engagement for Active Learners from Presentation 1 to Presentation 3, but this was not replicated for Returning Learners.

4.1.22 World War 1: Trauma and Memory

World War 1: Trauma and Memory was created in 2014 as a three-week course with two hours per week of recommended study time, comprising of 41 steps, to mark the centennial year of the beginning of World War 1. The course covers the aspects of World War 1 that were left unresolved at the end of the war in 1918, which contributed to the declaration of World War 2 in 1939. The period of 1914–1918 and its ramifications are reviewed within the course, covering aspects such as physical and mental trauma, the treatments given at the time and how the war was represented in

the media and history books. The course demonstrates the widespread issues of trauma beyond combatants and within the civilian population. Learners are also directed on how to develop their skills to conduct their own independent research to find and handle data and share their findings within the course.

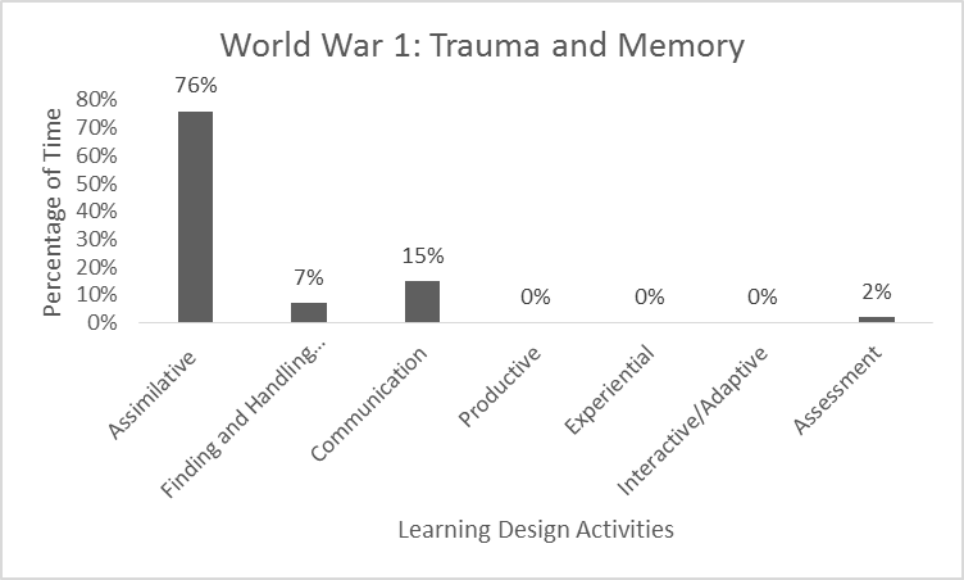

Figure 16: Learning Design for World War 1: Trauma and Memory

Within the three weeks of the course learners are presented with 12 videos to demonstrate the impact of the war on combatants and civilians. The videos also contain guidance on how to conduct research as learners are then expected to locate information external to the course (finding and handling information) to return to the course with to share with learners within the six discussion steps. There were no formative quizzes within the course, only a summative test in the final week.

Table 20: Performance Dashboards for World War 1: Trauma and Memory

	Presentation 1	Presentation 2	Presentation 3
Learners	5,504	2,263	2,251
Active Learners	4,765 (86.57%)	1,908 (84.31%)	1,567 (69.61%)
Returning Learners	3,312 (60.17%)	802 (35.44%)	925 (41.09%)

The course gained interest on its launch due to the presentation timing with Armistice Day in the centennial year which may help explain the variance between the Active and Returning Learners from Presentation 1 to Presentation 3.

4.1.23 Summary of MOOC Learning Designs and Performance Data

To understand the overall performance of MOOCs against their learning designs, the data from Tables 2 to 20 above were collated as sum totals for all presentations and then the totals calculated for all combined presentations to produce a benchmark to measure each MOOC title against (see Table 21).

Table 21: Dashboards Overall Performance

MOOC title	Number of Presentations	Number of Learners	Number of Active Learners	Number of Returning Learners
Basic Science: Understanding Experiments	4	8,776	5,984 (68.19%)	3,478 (39.63%)
Basic Science: Understanding Numbers	4	14,303	10,805 (75.54%)	5,923 (41.41%)
Challenging Wealth and Income Inequality	4	8,570	6,063 (70.75%)	3,069 (35.81%)
Childhood in the Digital Age	6	18,479	14,282 (77.29%)	6,668 (36.08%)
Elements of Renewable Energy	4	12,134	9,589 (79.03%)	5,697 (46.95%)
Forensic Psychology: Witness Investigation	4	33,922	29,368 (86.58%)	16,464 (48.53%)
From Notation to Performance: Following a Musical Score	3	8,157	4,478 (54.90%)	4,084 (50.07%)
Get Started with Online Learning	5	11,664	9,204 (78.91%)	3,895 (33.39%)
Introduction to Cyber Security	8	80,989	63,502 (78.41%)	35,855 (44.27%)
In the Night Sky: Orion	2	16,968	14,966 (88.20%)	9,615 (56.67%)
Managing My Investments	3	21,139	15,803 (74.76%)	7,890 (37.32%)
Managing My Money	4	31,285	23,741 (75.89%)	12,336 (39.43%)
Smart Cities	4	11,135	7,644	3,600

			(68.65%)	(32.33%)
Start Writing Fiction	6	81,432	71,629 (87.96%)	33,553 (41.20%)
The Business of Film	2	6,854	5053 (73.72%)	2,265 (33.05%)
The Lottery of Birth	3	6,351	5,163 (81.29%)	2,669 (42.02%)
The Science of Nuclear Energy	3	6,878	5,723 (83.21%)	3,331 (48.43%)
The Science of Nutrition	3	26,481	22,746 (85.90%)	12,502 (47.21%)
World War 1: Trauma and Memory	3	10,018	8,240 (82.25%)	5,039 (50.30%)
Totals for all MOOCs	**76**	**415,535**	**333,983 (80.37%)**	**177,933 (42.82%)**

This can be better visualised in the following two figures for Active and Returning Learners.

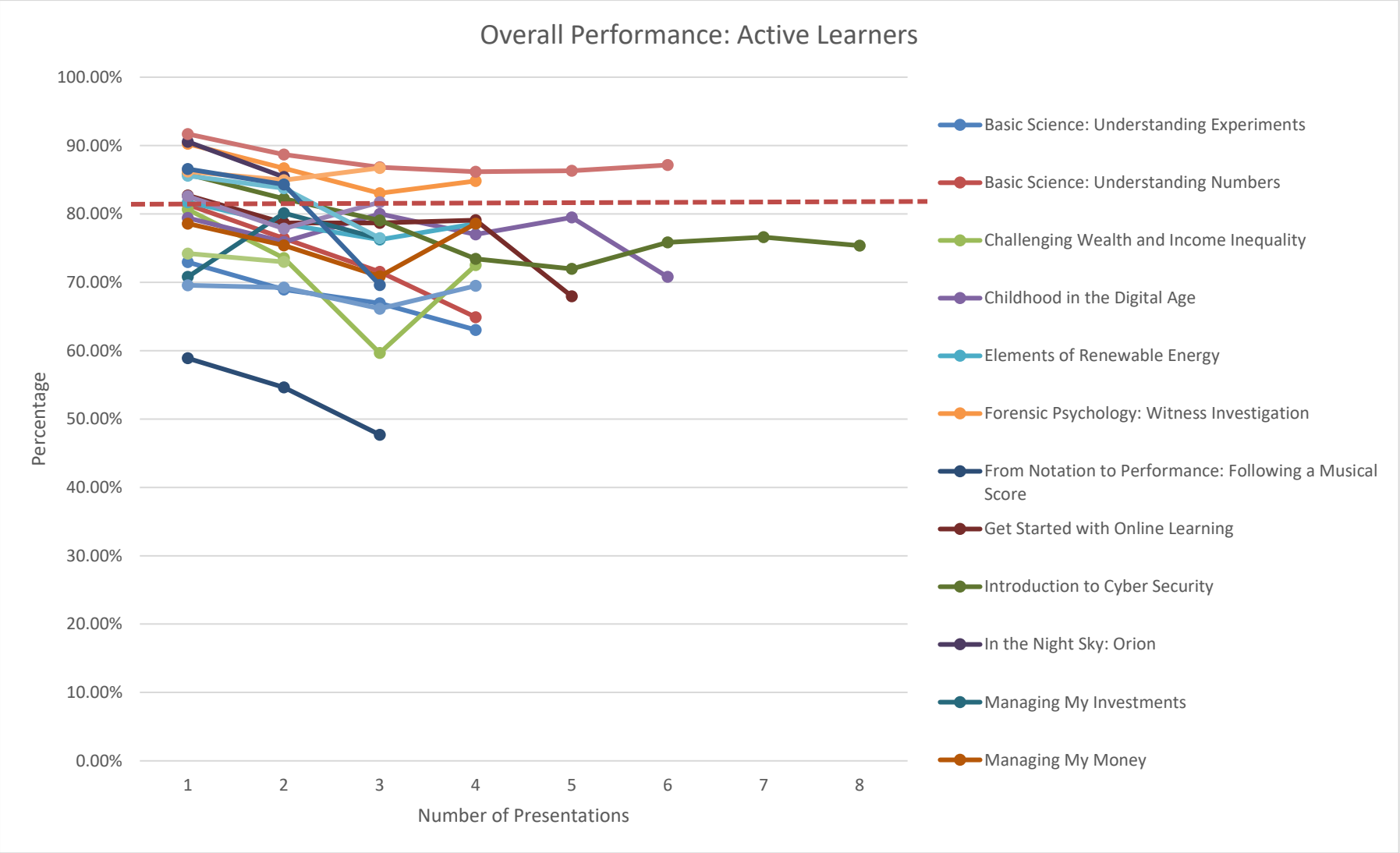

Figure 17: Overall Performance: Active Learners

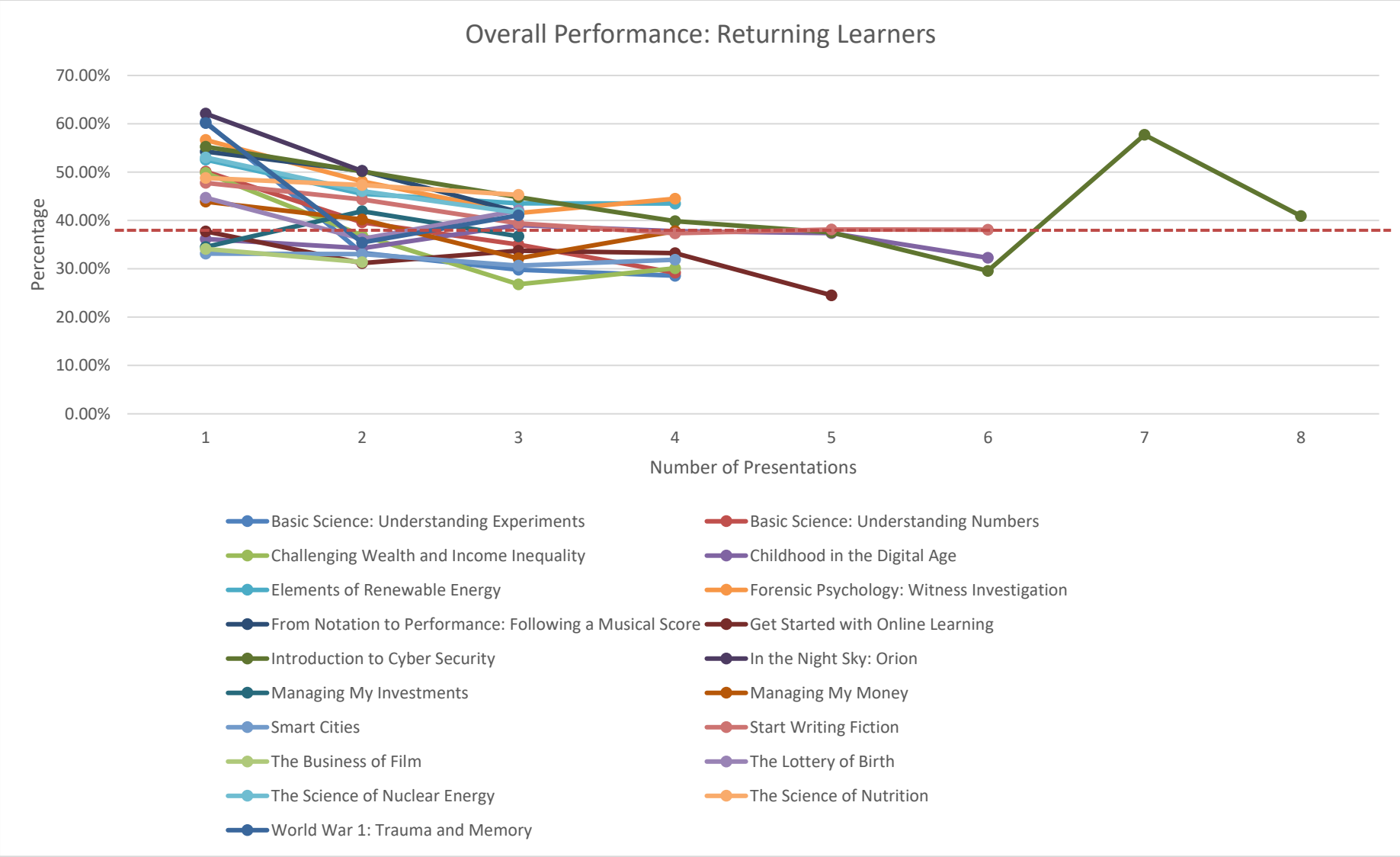

Figure 18: Overall Performance: Returning Learner

Table 21 and Figure 21 demonstrates that there are seven MOOCs that are above the 80.37 percent total of Active Learners (as identified in Table 21 above) as a percentage of Learners, namely:

- Forensic Psychology: Witness Investigation
- In the Night Sky: Orion
- Start Writing Fiction
- The Lottery of Birth
- The Science of Nuclear Energy
- The Science of Nutrition
- World War 1: Trauma and Memory

However, there are eight MOOCs that are above the 42.82 percent total of Returning Learners (as identified in Table 21 and Figure 22 above) as a percentage of Learners, namely:

- Elements of Renewable Energy
- Forensic Psychology: Witness Investigation
- From Notation to Performance: Following a Musical Score
- Introduction to Cyber Security
- In the Night Sky: Orion
- The Science of Nuclear Energy
- The Science of Nutrition
- World War 1: Trauma and Memory

From comparing these two findings, there are only five MOOCs that are above the total Active Learners and Returning Learners:

- Forensic Psychology: Witness Investigation
- In the Night Sky: Orion
- The Science of Nuclear Energy

- The Science of Nutrition
- World War 1: Trauma and Memory

To review these findings against the learning designs for the MOOCs, the percentages for learning activities were collated in Table 22 below.

Table 22: Top Five MOOCs for Overall Performance

	Forensic Psychology: Witness Investigation	In the Night Sky: Orion	The Science of Nuclear Energy	The Science of Nutrition	World War 1: Trauma and Memory
Number of weeks in length	8	4	4	4	3
Number of hours per week	3	3	3	3	2
Active Learners (%)	86.58	88.20	83.21	85.90	82.25
Returning Learners (%)	48.53	56.67	48.43	47.21	50.30
Assimilative (%)	78	55	54	63	76
Finding and handling information (%)	0	4	8	2	7
Communication (%)	11	17	17	20	15
Productive (%)	3	4	0	5	0
Experiential (%)	0	17	0	4	0
Interactive/adaptive (%)	1	0	4	0	0
Assessment (%)	8	1	17	6	2

The results from Table 22 demonstrate that the primary learning activity of the top five MOOCs for overall performance is assimilative in each. In comparison to the other MOOCs reviewed none of the top five MOOCs were the highest for assimilative activities, nor the lowest. The highest-ranking MOOCs for assimilative activities were Childhood in the Digital Age (90 percent), Challenging Wealth and Income Inequality (80 percent) and The Business of Film (79 percent). The lowest-ranking MOOCs for assimilative activities were The Lottery of Birth (38 percent), Start Writing Fiction (39

percent) and Smart Cities (39 percent). In relation to all the courses reviewed, the top five MOOCs ranked fourth (Forensic Psychology: Witness Investigation), fifth (World War 1: Trauma and Memory), seventh (The Science of Nutrition), ninth (In the Night Sky: Orion) and tenth (The Science of Nuclear Energy), clustering them centrally within the 19 MOOCs.

Though they are of varying percentages, the lowest is 54 percent in The Science of Nuclear Energy, in which the next most-common activity types are communication and assessment (17 percent each) with a 37 point differential in percentage to assimilative, making it still the primary learning design activity. In all the shortlisted MOOCs communication is the secondary activity and The Science of Nuclear Energy and In The Night Sky: Orion are the only MOOC with the same percentage for assessment and communication. Four of the MOOCs have finding and handling information in their learning design and though Forensic Psychology: Witness Investigation does not, neither does it rank the lowest for Active or Returning Learners percentages. This demonstrates that whilst learners find finding and handling information engaging in some courses, the absence of it in other courses does not impede engagement.

Of these most-engaging courses, In the Night Sky: Orion retains the highest percentage for both Active and Returning Learners. It has the second lowest percentage in terms of assimilative activities, but the highest in terms of experiential activities. The Science of Nutrition retained the highest percentage for communication and productive activities, and The Science of Nuclear Energy retained the highest percentage for finding and handling information and interactive/adaptive activities. What this table demonstrates is that there is no distinct pattern in terms of the collective review of these learning designs, as they do not all display similar predominant features in terms of learning design (e.g. very high assimilative and communication activities, with low or zero percentage in the other learning design activities). In terms of the literature reviewed, a significant proportion concentrated on specific types of content such as comments and assessments (Ferguson and Clow, 2015; Ferguson et al., 2015; Ferguson and Clow, 2016), content with associated

assessment (Kizilcec et al., 2013) or video content (Seaton et al., 2013; Guo et al., 2014). Literature regarding the learning design of MOOCs in their entirety based on the taxonomy by Rienties et al. (2015), in comparison to engagement performance data within the MOOCs, could not be found. The literature reviewed that referred to learning designs in terms of engagement focussed on completion or sentiment mining of comments, which this research has strived not to do. Therefore, in terms of what this research has set out to do, and at the scale of MOOCs produced by the same team, for the same university, hosted on the same platform, in the same time period, these findings are new.

The courses shortlisted are also different in length of time, ranging from three to eight weeks, and six to 24 hours of study. However, as highlighted in Section 4.1.9, Forensic Psychology: Witness Investigation is written to a story-like structure whereby learners are unable to move ahead within the course presentation as each forthcoming week is opened on a Monday, leaving learners on 'cliff-hangers' at the end of each week to create suspense for the next week to increase engagement and retention (Pike and Gore, forthcoming). The other anomaly in course length and time is World War 1: Trauma and Memory. This course is at the other end of the spectrum being the shortest in terms of time. However, as described in Section 4.1.22, the launch of this course was timed to coincide with the centennial commemorations of Armistice Day for World War 1 which, due to news coverage and promotion within the platform, may have increased learner engagement due to external factors as engagement with the course after these events lessened (see Table 22).

Removing these two outliers from the five courses leaves In the Night Sky: Orion, The Science of Nuclear Energy and The Science of Nutrition. These three courses are all four weeks in length with each identifying three hours of recommended study per week. Two of these remaining MOOCs fall within the Science, Maths and Technology category on FutureLearn, with the addition of the Nature and Environment category, while The Science of Nutrition is categorised as Health and Psychology. All courses are mapped by FutureLearn subject category in Table 29.

In terms of engagement in correlation to learning design, the top five MOOCs that learners engage with do not have commonalities in the types and frequency of learning design taxonomies used, length in weeks, recommended study hours per week or subjects covered. The difficulty in reviewing the literature in conjunction with these findings is due to the limited availability of researched MOOCs produced to this sample size from the same university following the same learning design taxonomy. Findings within the literature have a much smaller breadth of MOOCs reviewed or concentrate on completion data, which is not the focus of this research. Forensic Psychology: Witness Investigation follows a weekly release, story-like structure but it is not the highest in terms of Active and Returning Learners, nor is it the lowest. What these finding demonstrate is that, in line with the definition of engagement provided within this study, learners engage with the content in the same manner, but due to the large heterogeneous population of MOOC learners, the level of engagement does not favour MOOCs of a particular learning design, course length or subject type. This is a new contribution from a dataset of this scale.

4.2 Addressing the First Research Question

This section of the thesis concentrates on addressing the first research question: '*Why do learners engage in massive open online courses (MOOCs)?'* To achieve this, the responses to the beginning-of-course survey sent to Joiners within their course emails were analysed.

If a learner has joined multiple OU MOOCs they receive an email containing a link to each individual survey for the presentation that they joined. Therefore, a learner could potentially respond to more than one survey for each different MOOC, but only respond to one survey for each presentation. Given the range of subjects presented by the OU as MOOCs, it is possible that a learner could have different reasons for learning from each MOOC. Therefore, the data collected for analysis will be referred to as 'responses' instead of 'respondents'.

Within the beginning-of-course survey the responses to the question '*Why are you interested in studying this course? (tick all that apply)'* were isolated for the purposes of addressing the research

question. This survey question was selected for this study as, following on from the literature, engagement is a necessary prerequisite for learning (Guo et al., 2014). So for the learners to have an interest in studying the course they must therefore engage with it. The survey question isolated was the first question posed in a 19 question survey. The responses that learners could select were:

- Personal interest
- Professional development
- Relevant to my work
- Relevant to current studies
- To prepare me for future study
- For the purpose of teaching others
- For the purpose of sharing with others
- Relevant to voluntary work
- To improve my English
- To find out if I can study at this level
- To find out more about The Open University
- To find out more about FutureLearn or MOOCs in general
- The course was free
- To try learning online
- To learn more flexibly around my other commitments

The results were collated and organised per MOOC, collectively by subject category type (identified by FutureLearn's categories, see Table 23 below) and collectively overall to identify whether learners had varying interests in studying depending on the individual MOOC, by subject category, and to identify a pattern of interest in MOOCS overall at a collective level.

4.2.1 Survey Responses – Findings Overall

The survey was sent to 800,038 Joiners (those who have enrolled) in the beginning-of-course emails from which 120,842 responses were received giving a 15.10 percent response rate. Table 23 below provides a breakdown of Joiners, number of survey responses and the response rate by percentage by MOOC. The table also identifies the categories in which the MOOCs are listed by FutureLearn. The number in brackets denotes the number of categories the MOOCs are displayed in due to some categories having long titles which may give the impression of multiple/additional categories.

Table 23: Number of Joiners and Survey Responses per MOOC

MOOC title	FutureLearn subject category	Number of Joiners	Number of survey responses	Response rate by percentage
Basic Science: Understanding Experiments	Science, Maths and Technology (1)	22,439	1,489	7.97
Basic Science: Understanding Numbers	Science, Maths and Technology (1)	27,845	3,930	14.11
Challenging Wealth and Income Inequality	Business and Management. Politics and the Modern World (2)	18,064	2,567	14.21
Childhood in the Digital Age	Health and Psychology. Online and Digital (2)	38,612	4,456	11.54
Elements of Renewable Energy	Nature and Environment. Science, Maths and Technology (2)	26,761	3,400	12.71
Forensic Psychology: Witness Investigation	Health and Psychology. Law (2)	64,203	10,129	15.78
From Notation to Performance: Following a Musical Score	Creative Arts and Media (1)	14,948	2,555	17.09
Get Started with	Online and Digital. Teaching and Studying	28,068	3,317	11.82
Hannah Gore				

Online Learning	(2)			
Introduction to Cyber Security	Online and Digital (1)	134,826	20,395	15.13
In the Night Sky: Orion	Nature and Environment. Science, Maths and Technology (2)	27,929	4,471	16.01
Managing My Investments	Business and Management (1)	41,591	8,686	20.88
Managing My Money	Business and Management (1)	63,645	7,530	11.83
Smart Cities	Science, Maths and Technology (1)	23,357	2,108	9.03
Start Writing Fiction	Creative Arts and Media. Languages and Culture (2)	142,995	30,581	21.37
The Business of Film	Business and Management. Creative Arts and Media (2)	16,455	1,398	8.50
The Lottery of Birth	Politics and the Modern World (1)	14,584	2,425	16.63
The Science of Nuclear Energy	Nature and Environment. Science, Maths and Technology (2)	15,381	1,647	10.71
The Science of Nutrition	Health and Psychology. Science, Maths and Technology (2)	55,132	6,344	11.51
World War 1: Trauma and Memory	History (1)	23,203	3,414	14.71
	Total	**800,038**	**120,842**	**15.10**

This table demonstrates that there is no distinct pattern in the response rate in conjunction with the subject categories in which the MOOCs are categorised for searches made by the learners and for marketing by FutureLearn. For example, learners undertaking MOOCs in the Science, Maths and Technology category are no more or less likely to respond to the survey than learners undertaking Hannah Gore

MOOCs in the Business and Management or in the Creative Arts and Media categories, such as Start Writing Fiction (21.37 percent response rate) and From Notation to Performance: Following a Musical Score (17.09 percent response rate). These MOOCs have a higher response rate than seven MOOCs in the Science, Maths and Technology category and three MOOCs in the Business and Management category with Managing My Investments (20.88 percent) being the exception. Introduction to Cyber Security, which is the second most successful MOOC in terms of the number of Joiners, had a 6.24 percent lower response rate than Start Writing Fiction even though it had the highest number of presentations at eight.

What this demonstrates is that learners are no more or less likely to complete the related course survey in terms of how the course performed with regards to Learners, Active Learners and Returning Learners or number of presentations.

The courses that received a higher response rate than the 15.10 percent mean average are shown in Table 24.

Table 24: MOOCs with Above Mean Average Survey Response Rate

MOOC title	FutureLearn subject category	Number of Joiners	Number of survey responses	Response rate by percentage
Start Writing Fiction	Creative Arts and Media. Languages and Culture (2)	142,995	30,581	21.37
Managing My Investments	Business and Management (1)	41,591	8,686	20.88
From Notation to Performance: Following a Musical Score	Creative Arts and Media (1)	14,948	2,555	17.09
The Lottery of Birth	Politics and the Modern World (1)	14,584	2,425	16.63
In the Night Sky: Orion	Nature and Environment. Science, Maths and Technology	27,929	4,471	16.01

Hannah Gore

	(2)			
Forensic Psychology: Witness Investigation	Health and Psychology. Law (2)	64,203	10,129	15.78
Introduction to Cyber Security	Online and Digital (1)	134,826	20,395	15.13

As Table 24 demonstrates there is no distinct pattern in association with the category or categories that the MOOCs are identified in or in the number of Joiners, so therefore learners are no more likely to engage with surveys based on particular academic fields. Those taking part in MOOCS listed in more than one category were not more likely to respond to the survey as those listed only in one category. For example, Forensic Psychology: Witness Investigation did not receive a higher response rate than the four single-category MOOCs in the table. There is also no distinct pattern in the type of category the MOOCs are identified within as the MOOC categories for the OU are fairly represented. In addition there is no distinct pattern in the relation between the number of Joiners and the percentage response rate, with Start Writing Fiction and Introduction to Cyber Security having the highest numbers of Joiners but being ranking first and seventh within Table 24 respectively. It is noted that Forensic Psychology: Witness Investigation and In the Night Sky: Orion feature in both shortlisted tables in terms of performance (Table 22) and survey responses (Table 24) meaning that the learners were engaged not only with the course, but also the related survey.

The selected responses to the question '*Why are you interested in studying this course? (tick all that apply)'* were collated and are presented overall and then per MOOC as follows:

Table 25: Survey Responses Overall (n=120,842)

	Number of responses in terms of percentage
Personal interest	87.3
The course was free	35.1

Professional development	34.8
To try out learning online	23.5
Relevant to my work	22.1
To learn more flexibly around my other commitments	21.3
To prepare me for future study	17.8
For the purpose of sharing with others	14.6
To improve my English	12.6
Relevant to my current studies	11.6
To find out more about FutureLearn or MOOCs in general	10.2
To find out if I can study at this level	9.2
To find out more about The Open University	8.7
For the purpose of teaching others	8.6
Relevant to voluntary work	5.7

In the responses, learners were able to select more than one option as there may be more than one reason for registering with a MOOC. The options receiving more than 20 percent of the responses were:

- Personal interest (87.3 percent)
- The course was free (35.1 percent)
- Professional development (34.8 percent)
- To try out learning online (23.5 percent)
- Relevant to my work (22.1 percent)
- To learn more flexibly around my other commitments (21.3 percent).

In reviewing these responses in conjunction with the results in Table 25 above, given that 87.3 percent of learners are registering on MOOCs for personal interest, the course with the highest

number of Joiners and with the highest survey response rate is the Creative Arts and Media course Start Writing Fiction, which is associated with personal rather than professional interest as a subject, in terms of the categories for professional interest as set by FutureLearn (business, teaching, health and digital skills). The course with the third highest percentage of the survey response rates is From Notation to Performance: Following a Musical Score, which has the second lowest number of Joiners but the third highest percentage of survey response rates. However, this higher level of response rate from MOOCs associated with the Creative Arts and Media category is skewing the overall data. Therefore, the response data overall for each individual MOOC title (the number of presentations for each MOOC combined within) was collated and is displayed in Table 26 below.

Conversely the responses receiving the lowest number of selections (below 10 percent) in answering the question *'Why are you interested in studying this course? (tick all that apply)'* were:

- Relevant to voluntary work (5.7 percent)
- For the purpose of teaching others (8.6 percent)
- To find out more about The Open University (8.7 percent)
- To find out if I can study at this level (9.2 percent)

The fifth lowest response, recorded at 10.2 percent, was 'To find out more about FutureLearn or MOOCs in general'.

From these lowest responses it is evident that the learners are not necessarily concerned with finding out about the University in conjunction with the MOOC or the host platform, or whether there is the option for continuation of study to a formal level. Given that the responses 'The course was free' (34.8 percent) and 'Professional development' (35.1 percent) have a differential of only 0.3 percentage points but 'Personal interest' (87.3 percent) and 'Professional development' have a differential of 52.5 percentage points, undertaking MOOCs for personal interest is clearly defined, especially in light of the range of subjects the OU has to offer in its MOOCs.

The survey responses were then categorised by each MOOC title combining the survey responses for the presentations of each. The number of times a MOOC has been presented is given as a number in brackets after each title. The average and standard deviation were calculated from the survey responses. Where the responses were greater than the standard deviation plus average the cell was highlighted green, and where less than the cell was highlighted red.

Table 26: Survey Responses per MOOC by Percentage

	Experiments (4)	Numbers (4)	Wealth (4)	Childhood (6)	Renewables (4)	Forensics (4)	Musical Score (3)	Online Learning (5)	Cyber Security (8)	Orion (2)	Investments (3)	Money (4)	Smart Cities (4)	Fiction (6)	Film (2)	Birth (3)	Nuclear Energy (3)	Nutrition (3)	World War 1 (3)	Average	Standard Deviation
Personal interest	77	82.3	89.2	80	80.9	86.3	93.4	67.7	77.9	97.8	91.5	94.7	73.8	94	75	90.6	85.5	89.7	92.5	85.3	8.393276
Professional development	28.3	26.3	25.5	52.1	42.1	31.2	17	41.8	57.1	4.4	28	23.8	63.2	32	61.6	22.6	28.8	27.1	15.4	33.1	16.016
Relevant to my work	22	14.6	15.3	44.3	25.9	16.7	11.1	18.7	42.9	2.8	23.9	10.3	44.5	14.3	44.3	17.7	19.7	19.7	12.7	22.2	12.6791
Relevant to my current studies	20.5	16.8	13.5	16.9	18.7	17.8	11.9	16	12.1	4.5	15.7	4.2	17.2	7.9	13.8	12.9	13.3	8.7	11.8	13.4	4.541608
To prepare me for future study	26.7	30.8	18.2	15.8	26.8	26.4	13	54	20.4	9.6	13.3	10.2	20.9	12.5	18	16.9	19.2	15.5	11	20.0	10.26425
For the purpose of teaching others	28.5	10.9	7.3	18.1	10.3	3.9	7.9	15.6	9.7	4.7	14.6	5.8	8.3	5.5	7.4	7.8	7.7	12.4	7.3	10.2	5.813631
For the purpose of sharing with others	20.8	10.5	24.3	25.9	20.4	8.1	11.7	13.6	17.7	14.1	12.2	13.6	18.5	11	10	18.8	14.4	23.9	15	16.0	5.238516
Relevant to voluntary work	4.1	3.1	14.1	9.6	9.6	5.6	5.1	6.7	5.4	2.5	12.8	4.3	8.3	3.3	6.2	10.7	2.6	5	5.7	6.6	3.400034
To improve	18.3	17.3	10.8	12	15.9	9.2	9.5	29.9	7.1	5.4	9	10.2	15.9	18.7	9.3	11	12	9.3	6.5	12.5	5.77407

my English																				
To find out if I can study at this level	11.1	13.7	7.4	5.1	8.5	13.2	6.1	**26.4**	7.8	8.1	9.7	6.3	6.1	9.3	5.3	8	8.5	7.3	8.6	9.3	4.762457
To find out more about The Open University	8.9	10	7.2	6.8	8.4	9.2	5.8	**30.4**	8.3	6.8	7.7	7.4	7.4	8.5	7.1	7.6	8.1	7.3	8	9.0	5.272304
To find out more about FutureLearn or MOOCs in general	11.2	13	10.6	8.5	10.4	11.1	7.7	**23.7**	10.3	9.7	7.6	9.8	9.7	10.2	7	9.1	8.6	6.9	12	10.4	3.622743
The course was free	38.8	37.4	36.3	34	33.3	36.1	34.4	35.3	34.9	37.3	**8.6**	37.8	28.1	**41**	33.5	34.9	33.2	33.1	35.7	33.9	6.695237
To try out learning online	23.8	24.5	19.6	20	21.4	25.6	16.2	**49.5**	20.5	19.9	18.8	23.3	18.5	27	18.2	19.2	15.4	21	24.8	22.5	7.259191
To learn more flexibly around my other commitments	18.1	19.9	22.2	21.3	19.3	22.8	17.1	**28.2**	16.8	17.1	**10.4**	22.2	16.5	**28.2**	19	21	16.7	18.9	21.9	19.9	4.127663

Table 26 demonstrates that with every MOOC the learners selected 'Personal interest' as their primary reason for enrolling on the course. This is reflected in the overall data in the findings from Table 25, whereby the highest response received overall denoted personal interest. This helps to validate that learners' significant interest in MOOCs is not primarily associated with professional development or interest in formal study, but instead to fulfil their interests as leisure learners (learners who have no intention of progress from for-free learning to for-fee study). Through the application of standard deviation it was demonstrated that Get Started with Online Learning was engaged with not primarily for the purpose of 'Personal Interest', but instead distinctly for preparation for future study, to improve English language skills, to find out about the OU, studying at that level, online learning and whether the learner was suitable to undertake distance learning around their other commitments. Though a financial course, Managing My Money standard deviation results demonstrated that learners were primarily undertaking the course for personal interest and not with any additional associated learning or professional development.

Of the 19 MOOCs only five received 'Professional development' as their secondary interest to 'Personal development' and were:

- Smart Cities (63.2 percent)
- Introduction to Cyber Security (57.1 percent)
- Childhood in the Digital Age (52.1 percent)
- Elements of Renewable Energy (42.1 percent)
- Managing My Investments (28.0 percent)

Of these MOOCs four received responses that placed 'Relevant to my work' in tertiary position, with Elements of Renewable Energy positioning this fifth and ranking 'The course was free' third. This data demonstrates that learners have a stronger preference to enrol in MOOCs for personal rather than professional reasons. Within Table 26, the courses that resulted in a positive standard deviation for both professional development and relevancy to work were:

- Childhood in the Digital Age
- Introduction to Cyber Security
- Smart Cities
- The Business of Film

In reviewing the content of these four courses, three of them (with exception to The Business of Film) were focussed on the future of technology and educational technology (though the FutureLearn categories for the courses differ). This may have been a factor in the determining of the learner's interest. It is possible that the removal of extrinsic factors such as career development and advancement on salary grades, coupled with not needing to progress to formal study for career benefit, may impact on the learners' engagement until completion, whereby the MOOC host and platform benefit from commercial gain if the MOOC subject is aligned with learner's needs.

Using the process identified above when analysing the data for Table 26, the top six responses and the bottom four responses to the survey question were identified for each MOOC. The numbers in the cells correlate to the percentage given for each survey response option, with the number of presentations indicated in the brackets next to the course title in Table 26 above. The reason for this multi-perspective view is due to the absence of such findings in the literature reviewed. To date research pertaining to why learners engage with MOOCs has been carried out on a single MOOC or a small number of MOOCs. Where a small number of MOOCs has been reviewed this has not consistently been achieved through a single platform, using the same survey, to this scale or over such a period of time. Therefore, the findings from 76 presentations of 19 MOOCs over a three-year time period, hosted on the same platform, using the same survey is a new contribution, so therefore multiple perspectives are used to reliably address the research question.

The options selected most frequently from the survey question options for each individual MOOC, shown in Table 27, were options 1 and 13 – 'Personal interest' and 'The course was free' – with 19 occurrences each. 'Professional development' was selected 17 times, 'To try out learning online' 14

times and ‘To learn more flexibly around my other commitments’ 12 times. Conversely the options selected least frequently from the survey question options, shown in Table 28, were ‘Relevant to voluntary work’ (17 responses), ‘To find out more about The Open University’ (16 responses), ‘For the purpose of teaching others’ (14 responses) and ‘To find out if I can study at this level’ (ten responses). This data shows that learners who responded to the survey were most likely to engage with a MOOC because of personal interest and because it is free. MOOC hosts and platforms that wish to align MOOCs with formal curriculum and for commercial gain may have difficulty as this particular MOOC learner demographic ranks ‘The course was free’ higher in percentage and occurrence than ‘Professional development’ and ‘Relevant to my work’.

Table 27: Highest Percentage of Responses from Survey Question Options per MOOC

	Basic Science: Understanding Experiments (4)	Basic Science: Understanding Numbers (4)	Challenging Wealth and Income Inequality (4)	Childhood in the Digital Age (6)	Elements of Renewable Energy (4)	Forensic Psychology: Witness Investigation (4)	From Notation to Performance: Following a Musical Score (3)	Get Started with Online Learning (5)	Introduction to Cyber Security (8)	In the Night Sky: Orion (2)
First response option	1	1	1	1	1	1	1	1	1	1
Second response option	13	13	13	2	2	13	13	5	2	13
Third response option	6	5	2	3	13	2	15	14	3	14
Fourth response option	2	2	7	13	5	5	2	2	13	15
Fifth response option	5	14	15	7	3	14	14	13	14	7
Sixth response option	14	15	14	15	14	15	4	11	5	12

	Managing My Investments (3)	Managing My Money (4)	Smart Cities (4)	Start Writing Fiction (6)	The Business of Film (2)	The Lottery of Birth (3)	The Science of Nuclear Energy (3)	The Science of Nutrition (3)	World War 1: Trauma and Memory (3)
First response option	1	1	1	1	1	1	1	1	1
Second response option	2	13	2	13	2	13	13	13	13

Third response option	3	2	3	3	3	2	2	2	14
Fourth response option	13	14	13	15	13	3	3	7	15
Fifth response option	4	15	5	14	14	15	5	14	2
Sixth response option	6	3	7	9	15	14	15	4	7

Table 28: Lowest Percentage of Responses from Survey Question Options per MOOC

	Basic Science: Understanding Experiments (4)	Basic Science: Understanding Numbers (4)	Challenging Wealth and Income Inequality (4)	Childhood in the Digital Age (6)	Elements of Renewable Energy (4)	Forensic Psychology: Witness Investigation (4)	From Notation to Performance Following a Musical Score (3)	Get Started with Online Learning (5)	Introduction to Cyber Security (8)	In the Night Sky: Orion (2)
First response option	8	8	8	10	11	6	8	8	8	8
Second response option	11	11	11	11	10	8	11	7	9	4
Third response option	10	7	7	12	8	7	12	6	10	3
Fourth response option	12	6	6	8	6	11	6	4	11	6

	Managing My Investments (3)	Managing My Money (4)	Smart Cities (4)	Start Writing Fiction (6)	The Business of Film (2)	The Lottery of Birth (3)	The Science of Nuclear Energy (3)	The Science of Nutrition (3)	World War 1: Trauma and Memory (3)
First response option	12	4	10	8	10	11	8	8	8
Second response option	11	8	11	6	8	6	6	12	9
Third response option	13	6	6	4	11	10	11	10	6
Fourth response option	9	10	8	11	6	12	10	11	11

What is emerging from this data is that learners across all the MOOCs are strongly focussing on registering for MOOCs (regardless of the subject) for personal interest. Whilst the personal interest may initially attract them to the MOOC, it may not sustain interest in the form of engagement throughout the MOOC if learners are not extrinsically motivated to engage, given that 'The course was free' recorded at the same frequency as 'Personal interest'. Though 'Professional development' was selected 17 times, there is not a distinct pattern to suggest that MOOCs from certain categories are attracting learners for professional development despite the high frequency of 17 out of 19 MOOCs.

It is plausible that the learners who responded to the survey do not undertake many (if any) forms of voluntary work or teaching. Though the survey asks in later questions about their employment status, it does not single out teaching as a profession. Though the frequency of responses for 'To try out learning online' was high (15 occurrences out of 19), the number of occurrences for 'To find out more about The Open University' was low. If the strategic purpose of MOOCs for the OU is to create return of investment via learner to student enquiry and registration, then further review of the positioning of the MOOCs and demographic of the FutureLearn platform would be required. A potential change in positioning and demographic, influenced by these findings, that could impact on learner engagement could be a contribution to this field by this doctorate.

4.2.2 Survey Responses – Findings by Subject Category

As part of the FutureLearn search and identification of MOOCs, courses are assigned to categories by the platform based on their criteria, namely:

- Arts and Creative Media
- Business and Management
- Health and Psychology
- History
- Languages and Cultures

- Law
- Literature
- Nature and Environment
- Online and Digital
- Politics and the Modern World
- Science, Maths and Technology
- Sport and Leisure
- Teaching and Studying

Of these 13 categories, the 19 MOOCs selected for this research feature in ten of the categories as outlined below in Table 29, and ten MOOCs are identified in more than one category.

Table 29: MOOCs by FutureLearn Subject Category

MOOC title	FutureLearn subject category
Basic Science: Understanding Experiments	Science, Maths and Technology (1)
Basic Science: Understanding Numbers	Science, Maths and Technology (1)
Challenging Wealth and Income Inequality	Business and Management. Politics and the Modern World (2)
Childhood in the Digital Age	Health and Psychology. Online and Digital (2)
Elements of Renewable Energy	Nature and Environment. Science, Maths and Technology (2)
Forensic Psychology: Witness Investigation	Health and Psychology. Law (2)
From Notation to Performance: Following a Musical Score	Creative Arts and Media (1)
Get Started with Online Learning	Online and Digital. Teaching and Studying (2)
Introduction to Cyber Security	Online and Digital (1)
In the Night Sky: Orion	Nature and Environment. Science, Maths and Technology (2)
Managing My Investments	Business and Management (1)
Managing My Money	Business and Management (1)

Smart Cities	Science, Maths and Technology (1)
Start Writing Fiction	Creative Arts and Media. Languages and Culture (2)
The Business of Film	Business and Management. Creative Arts and Media (2)
The Lottery of Birth	Politics and the Modern World (1)
The Science of Nuclear Energy	Nature and Environment. Science, Maths and Technology (2)
The Science of Nutrition	Health and Psychology. Science, Maths and Technology (2)
World War 1: Trauma and Memory	History (1)

Of the responses received, seven MOOCs were above the 15.10 percent response rate, with only three being listed in more than one category. Of the seven MOOCs the categories that the courses were identified within are as follows:

- Business and Management
- Creative Arts and Media
- Health and Psychology
- Languages and Culture
- Law
- Nature and Environment
- Online and Digital
- Politics and the Modern World
- Science, Maths and Technology

Each category featured once in the shortlist with the exception of Creative Arts and Media in which both From Notation to Performance: Following a Musical Score and Start Writing Fiction were categorised. This demonstrates as with the previous sections that there is no distinct pattern of

categorisation as to the engagement with the survey. For example, learners were no more likely to respond to the survey if the course was within the Science, Maths and Technology category than in Business and Management. However, of the survey responses, four of the bottom five MOOCs were in the Science, Maths and Technology category, and this is notable as only seven of the 19 MOOCs are listed within this category.

4.2.3 Survey Responses – Key Findings by MOOC

In reviewing the survey response data from Table 29 above there a number of findings to note. Firstly, seven of the 19 MOOCs recorded above 90 percent for 'Personal interest' being why learners were interested in studying the course, with In the Night Sky: Orion scoring the highest at 97.8 percent. In the Night Sky: Orion was also in the top five performing MOOCs highlighted in Section 4.1.23. Of the remaining MOOCs, a further seven recorded 80 percent or above, with only five MOOCs scoring below 80 percent.

As stated previously, interest in studying the course for 'Professional development' did not factor as highly with four MOOCs scoring over 50 percent: Smart Cities (63.2 percent), The Business of Film (61.6 percent), Introduction to Cyber Security (57.1 percent) and Childhood in the Digital Age (52.1 percent). Only Introduction to Cyber Security and Childhood in the Digital Age feature within the same subject category on FutureLearn, Online and Digital (Childhood in the Digital Age is also listed in Health and Psychology). The only other MOOC that features in Online and Digital is Get Started with Online Learning which received 41.8 percent of responses, but this may be due to the content of the course being useful preparation to study at university level, and as a result 54.0 percent of the responses were 'To prepare me for future study', so career choices for post-university may not have been at the forefront of these learners' minds. The responses for 'Professional development' in correlation with 'Relevant to my work' were causal as expected, as the four MOOCs with the highest responses for 'Professional development' also had the highest responses for 'Relevant to my work'

demonstrating that is it possible that the courses were selected for both current and future career choices, in which the learners were using them to progress rather than change careers.

In relation to academic study five of the courses ranked highest in response to both 'Relevant to my current studies' and 'To prepare me for future study', namely, Basic Science: Understanding Experiments (20.5 percent and 26.7 percent), Basic Science: Understanding Numbers (16.8 percent and 30.8 percent), Elements of Renewable Energy (18.7 percent and 26.8 percent), Forensic Psychology: Witness Investigation (17.8 percent and 26.4 percent) and Get Started with Online Learning (16.0 percent and 54.0 percent). Of these MOOCS, three of the courses are listed within the Science, Maths and Technology category on FutureLearn. It is expected that Get Started with Online Learning would receive a high number of responses in relation to study given the course content, which may give an indication as to why it scored the lowest for 'Personal interest' (67.7 percent).

'Relevant to volunteer work', 'For the purpose of teaching others' and 'For the purpose of sharing with others' did not receive high percentages of responses from any of the learners across the MOOCs. This demonstrates that learners are engaging with the MOOCs largely for their own needs and not using the content, which is available under Creative Commons licencing, for the purpose of advancing the education of others.

The course with the highest response rate for 'To improve my English' was Get Started with Online Learning, which may be due to learners undertaking the course to understand what learning options are available for distance learning with the OU as this was the design and marketing purpose of the course. This is further supported by Get Started with Online Learning receiving the highest number of responses for 'To find out if I can study at this level', 'To find out more about The Open University' and 'To find out more about FutureLearn or MOOCs in general'. It is clear, due to the percentage of responses received for each of these, that learners engaging with this course were keen to develop their academic understanding of distance and online learning opportunities available to them as a 49.5 percent response rate was also received for 'To try out learning online' for this course.

As previously noted, 'The course was free' received collectively the second highest number of responses. This was noted in all the MOOCs with the exception of Managing My Investments which scored 19.5 percent lower than the next lowest response at 8.6 percent.

In the response 'To learn more flexibly around my other commitments' seven of the MOOCs scored above the average 21.3 percent represented in Table 26, with Get Started with Online Learning the only course scoring above average for this option but below 80 percent in response to learning for 'Professional interest'. This may be due to the learners engaging with the course alongside their pre-existing academic studies as emphasised earlier.

4.3 Addressing the Second Research Question

The data analysed in this section will address the second research question: '*What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*' To achieve this analysis, the related FutureLearn dashboard data and step activity associated with comments, likes and visits within each of the 76 presentations across the 19 MOOCs were analysed.

The learning designs and dashboards for each of the MOOCs as outlined in Section 4.1.1 were reviewed in conjunction with the associated performance reports. These were collated from the data located within the CSV (comma-separated values) files located within each of the presentations that were then exported into R reports via an R script (open source programming language to produce statistical reports and graphs).

As detailed in the methodology in Section 3.4.2 the category of Fully Participating Learner will not be reviewed for the purpose of this research. Firstly, as highlighted in the literature, not all learners that engage do so with the purpose of completion. Secondly, a learner may be engaged but may not meet the criteria of 'fully participating' as defined by FutureLearn so may be disregarded by default (e.g. by not marking steps as complete). Finally, as demonstrated in the data analysis in Section 4.2, of the 120,842 survey responses collated, 87.3 percent of learners defined their engagement with

MOOCs as 'Personal interest' and therefore may not feel the need to undertake the course to full completion (as also highlighted in the literature), or mark steps as complete or attempt the quizzes, but may still engage with the learning materials to increase their level of understanding of the subject. This final factor helps bridge the void between what a learner defines as engagement from the Initial Study and what the FutureLearn platform has defined as engagement. As identified in the Initial Study (Section 3.2) learners, though not meeting the 'fully participating' criteria set by FutureLearn, do not see themselves as disengaging, dropping out, quitting or failing the course. The learners in this study held the opinion that they had still engaged with the course to their own personal criteria.

To achieve an understanding of engagement with the materials to address the second research question, the R report 'Step Activity' within each of the presentations of the courses was reviewed to identify if there were repeating patterns in subsequent presentations of the same MOOC. Given each of the courses have had two or more presentations since each course launched on FutureLearn, identification of such patterns is possible.

Three elements of the Step Activity report were reviewed. As outlined in the literature review the data associated with Step Completions was not taken into consideration. Whilst this may seem counterproductive to research centred on engagement, this is due to the requirements for the achievement of this metric. For a learner's activity for Step Completion to be included in the report the learner must purposefully mark the step as complete on screen. This is an optional electronic feature within FutureLearn and one of the following three scenarios are possible: firstly, the learner engages with the step to their requirement then marks as complete; secondly, the learner does not engage at all with the step but marks as complete anyway; and finally, the learner engages with the step but does not mark it as complete as this is not a prerequisite of the user interface and not doing so saves time. Taking the above activity coupled with the previous reflections on the requirements

to be fully participating, the activities for the markers for step visits, comments and likes as an alternative method of measuring engagement were reviewed.

These three marker types aid in identifying content that learners are engaging with through selecting steps to visit from the step titles listed within the 'To do' list for each week of the course presented on FutureLearn, and the posting and liking of comments (the assumption being that learners will have engaged with the comments through reading to subsequently 'like' them). Using the same methodology in the analysis across all presentations of the MOOCs gives an indication as to whether certain steps are repeatedly more engaging than others.

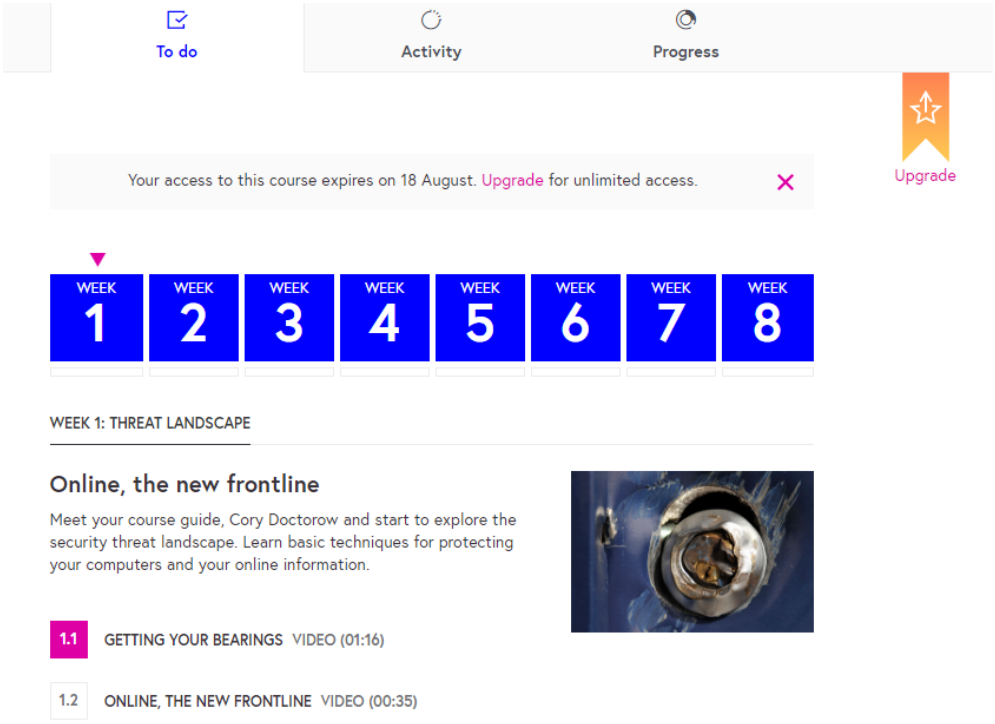

Figure 19: Example of a FutureLearn MOOC To-Do List

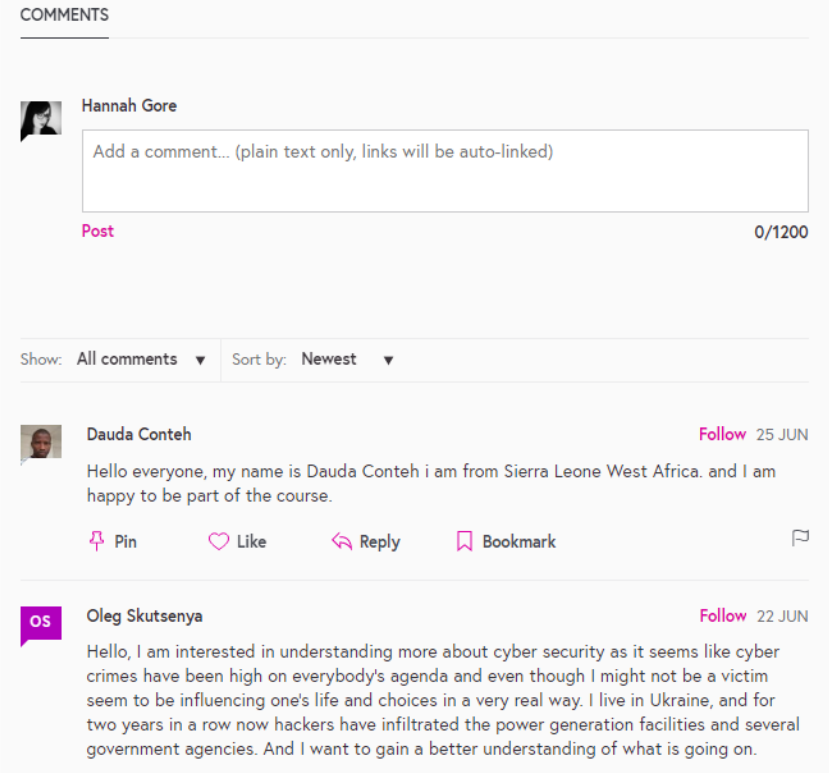

Figure 20: Example of a FutureLearn MOOC Comments and Like Functionality

As the timing of the presentation, the features of the platform and the learner population studying the course change with each presentation (as defined by FutureLearn) only the pedagogy of the course (as defined by the OU) remains the same, and is therefore the focus of this research. It is theorised that if levels of engagement are researched in each of these four key areas (see Section 1.8) and adjusted accordingly then optimum engagement with the learning design can be achieved. However, for the research defined for this thesis only the elements affecting engagement within the pedagogy are reviewed.

Within this research all the presentations were reviewed, not just the initial launch presentation, as this gave an indication as to whether the engagement was due to the pedagogy itself or the changes within the remaining three P's (platform, population and presentation) outside of the research's control, such as if learners were engaged due to a marketing campaign, an item in the news or a national event. The review of all presentations ensures that the response to the research question is as reliable as possible.

As demonstrated in the research carried out to answer the first research question, the MOOC learner population is a large one. Though 800,038 registrations were received on the 76 presentations as Joiners, only 425,792 of the Joiners became Learners by accessing the courses once they had started presentation, thus engaging with the content. It is not possible to define whether some of the 425,792 learners that accessed the course were the same 120,842 learners that responded to the survey as the two activities are not exclusive to one another. Therefore, this research is not reliant on one marker (fully participating) to answer the second research question, but instead on multiple markers to ensure reliability in analysis and conclusions drawn.

Mapping and aligning the engagement markers with the relevant steps and associated learning designs gave insight into which steps, and therefore which elements of learning design, engage learners. This mapping was repeated per presentation and then sorting was applied to define which were the top ten visited, commented on and liked steps for each presentation. Each of the top ten for the three categories were then isolated and collated to review which of these steps were repeatedly in each of the presentations. The purpose of this activity was to show that even in the changes that occur within platform, presentation and population, there are elements of the pedagogy (learning design, not individual FutureLearn steps) that are repeatedly engaging regardless of presentation.

In addition to this activity, these repeating steps were further isolated and cross-referenced for repetition between comments and likes to define which would be considered ‘Super Steps’ in terms of engagement within the top ten for comments and likes across all presentations for each of the MOOCs. These steps were then isolated and reviewed to define whether a pattern emerged as to their learning design activity type and FutureLearn taxonomy, for example to see if all the steps were assimilative and videos or articles. At present there is no literature available on the concept of cross-referencing the steps in this manner, so this finding would be a new contribution to research.

4.3.1 Step Activity Data – Findings Overall

In this section the data was analysed collectively to see whether there were any patterns or distinct anomalies from the courses, before grouping by subject category (as defined by FutureLearn) and then individually by course. This was compared to the learning design activities for the courses overall. The step activity data for visits, comments and likes were isolated from the R reports for each of the presentations of the 19 MOOCs. Figure 25 demonstrates that in reviewing the learning design of courses overall 62.03 percent of the design taxonomy were assimilative activities with 10.89 percent were communication activities. Whilst learners can comment on any of the assimilative activities the number of purposefully designed communication steps was significantly lower in comparison.

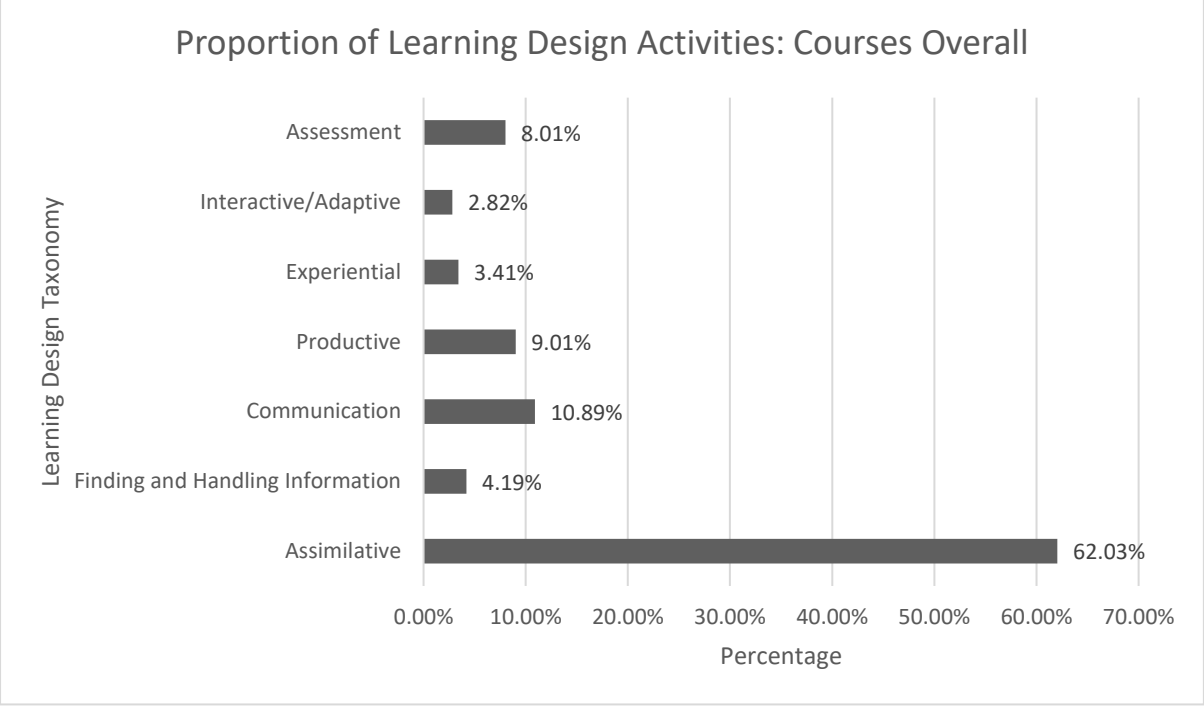

Figure 21: Proportion of Learning Design Activities: Courses Overall

In all of the presentations Week 1 of each MOOC received the highest number of visits in comparison to the rest of the course. However, not all of the presentations' top ten steps ranked in numerical order (e.g. from 1.2 to 1.11); there were two separate instances in the second

presentation of Basic Science: Understanding Numbers and the first presentation of The Business of Film in which step 1.11 preceded step 1.10 in number of visits. This pattern did not repeat in the other presentations by these courses. There does not seem to be a reason for this anomaly either. With Basic Science: Understanding Numbers step 1.10 is assimilative and 1.11 is assessment, and in The Business of Film step 1.10 is communication and step 1.11 is assimilative. Given that there is not a pattern to the steps preceding on the remaining presentations by the courses or in the learning design activity (e.g. if step 1.10 was assessment in both and the learners skipped the step to access further learning activity) then the probable cause for this anomaly is unknown.

As the pattern for the remaining 74 presentations is a sequential one for the visits, this element of the data will not be reviewed in further detail in the findings section below, as no further conclusions can be drawn as to the impact on learning design as, though the learning designs for steps 1.2 to 1.11 are different in all 19 MOOCs, the pattern of engagement via visits data (with the exception of the two presentations identified above) remains the same.

In reviewing the top ten steps for comments and likes, the step numbers identified were analysed to ascertain the learning design activity for each of the steps, as some steps may be labelled as assimilative using the FutureLearn step taxonomy but actually be interactive/adaptive, for example. This is a limitation of the FutureLearn platform whereby there is not the range of step types within their taxonomy to reflect the learning design taxonomy. Analysing each of the steps identified and then mapping them back to the learning design taxonomy used by the OU ensures that the research question can be reliably addressed.

Of the collectively reviewed top ten steps across the 76 presentations it was found that 59.19 percent of the steps were assimilative, 38.99 percent were communication, 0.42 percent were interactive/adaptive while experiential and productive each scored 0.70 percent.

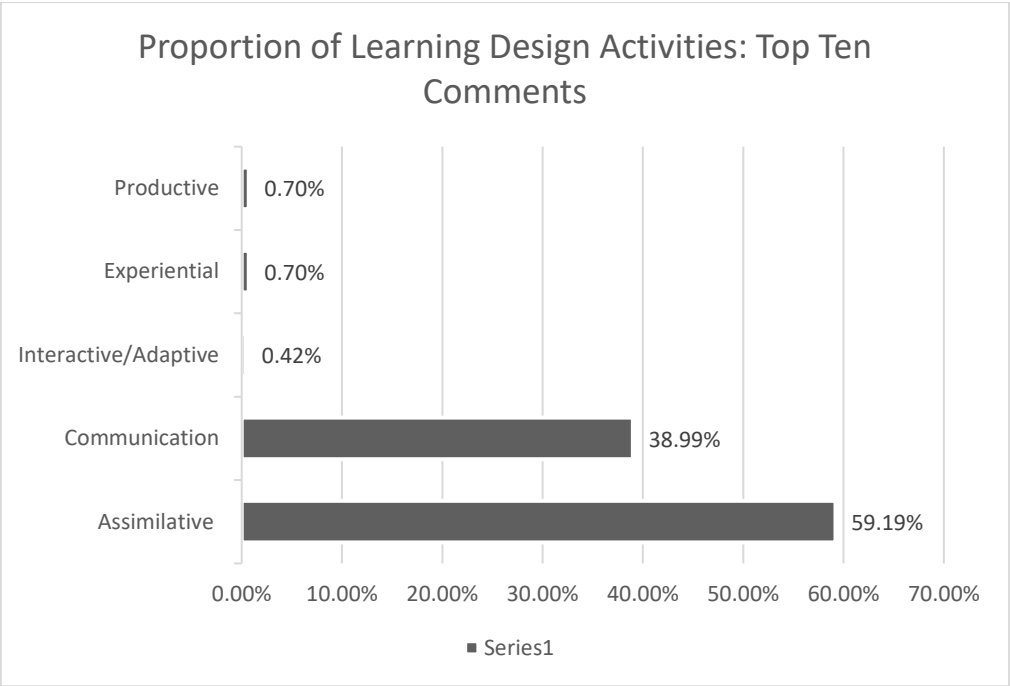

Figure 22: Proportion of Learning Design Activities: Top Ten Comments

Given that the courses overall collectively represent 10.89% of Communication the identification of 38.99% of the top ten steps being Communication is notable. Especially given that collectively Productive (9.01%) only represented 0.70% in the top ten for comments.

In comparison, when using the same methodology to review the learning design activity composition of the top ten steps for likes, the data calculations found similar results with 58.88 percent of steps being assimilative, 40.30 percent communication, 0.41 percent productive, 0.27 percent interactive/adaptive and 0.14 percent experiential.

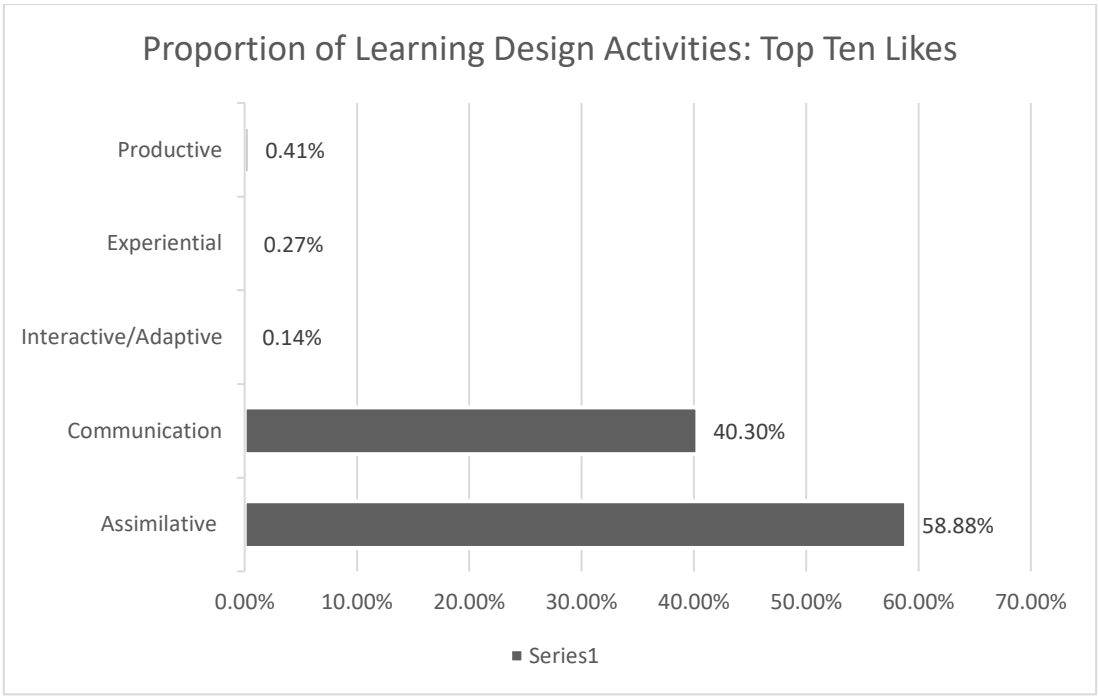

Figure 23: Proportion of Learning Design Activities: Top Ten Likes

Both Figure 26 and 27 demonstrate a stronger learner preference for assimilative activities for engagement in comparison to communication activities. Though learners can comment on every step in FutureLearn (with the exception of assessment steps), it may be thought that they are more likely to engage with a step that is assimilative than one specifically signposted as 'Discussion'. However, reviewing in conjunction with Figure 25 only 10.89 percent of the steps were purposefully designed to be communication activities. This is an interesting result to find as the learners are more likely to engage in comments and likes on non-discussion signposted steps such as articles and videos. This may be due to a higher number of assimilative steps being available within courses (see Figure 25), the content engaging the learner so they prefer to make or engage with the comments upon interacting with the materials than progress to a specified discussion step, or the assimilative steps not effectively directing learners to discussions on communication steps.

Table 30 below demonstrates the breakdown of the overall calculations of the top ten likes and comments using the learning design taxonomy into course-by-course display. As with previous tables the number of presentations per MOOC are displayed in brackets after the title.

Table 30: Breakdown of the Proportion of Learning Design Activities: Top Ten Comments and Likes

MOOC	Comments					Likes				
	Assimilative	Communication	Experiential	Productive	Interactive/ adaptive	Assimilative	Communication	Experiential	Productive	Interactive/ adaptive
Basic Science: Understanding Experiments (4)	21	19	0	0	0	16	24	0	0	0
Basic Science: Understanding Numbers (4)	35	5	0	0	0	36	4	0	0	0
Challenging Wealth and Income Inequality (4)	21	19	0	0	0	33	17	0	0	0
Childhood in the Digital Age (6)	44	16	0	0	0	50	8	0	0	2
Elements of Renewable Energy (4)	7	33	0	0	0	14	26	0	0	0
Forensic Psychology: Witness Investigation (4)	12	25	0	0	3	21	19	0	0	0
From Notation to Performance: Following a Musical Score (3)	14	16	0	0	0	21	9	0	0	0
Get Started with Online Learning (5)	24	21	0	5	0	28	19	0	3	0
Introduction to Cyber Security (8)	0	80	0	0	0	25	55	0	0	0
In the Night Sky: Orion (2)	4	16	0	0	0	11	9	0	0	0
Managing My Investments (3)	13	17	0	0	0	19	11	0	0	0
Managing My Money (4)	20	20	0	0	0	19	21	0	0	0
Smart Cities (4)	19	21	0	0	0	26	14	0	0	0

Start Writing Fiction (6)	41	19	0	0	0	36	24	0	0	0
The Business of Film (2)	13	7	0	0	0	15	5	0	0	0
The Lottery of Birth (3)	12	18	0	0	0	17	13	0	0	0
The Science of Nuclear Energy (3)	5	23	0	0	2	10	20	0	0	0
The Science of Nutrition (3)	16	11	3	0	0	22	7	1	0	0
World War 1: Trauma and Memory (3)	17	18	0	0	0	22	8	0	0	0

The findings within this table will be addressed in more detail in Sections 4.3.2 and 4.3.3 below.

4.3.2 Step Activity Data – Findings by Subject Category

In this section the step activity data is reviewed by subject category. The purpose of filtering the data in this manner is to ascertain whether learners engage with different elements of learning design dependent on subject. For example, would learners enrolled on an arts course engage more with assimilative steps that contained video as they may be more likely to be attracted to visual content? These different views of the data will reliably address the research question and help to advise those producing MOOCs in the future as to how different step types may engage learners dependent on subject.

As previously outlined in Section 4.2.2, the courses are assigned categories by FutureLearn. Reviewing the MOOCs with the highest number of steps for assimilative activities for comments – Childhood in the Digital Age, Start Writing Fiction, Basic Science: Understanding Numbers and Get Started with Online Learning – showed that only two of the courses were in the same FutureLearn category, which were Childhood in the Digital Age and Get Started with Online Learning (Online and Digital). The same pattern of activity occurred within communication for comments. The highest number of steps for communication activities for comments were found in Introduction to Cyber Security, Elements of Renewable Energy, Forensic Psychology: Witness Investigation and The Science of Nuclear Energy. Of these courses Elements of Renewable Energy and The Science of Nuclear Energy are categorised as both Nature and Environment, and Science, Maths and Technology by FutureLearn. When applying the same analysis to likes the same finding could not be replicated.

The analysis within this activity demonstrates that learners from a particular FutureLearn subject category are no more likely to engage within comments and likes on assimilative or communication steps in comparison to other subject categories. These findings were replicated when reviewing courses with engagement in experiential, productive and interactive/adaptive learning activities when mapped against subject category.

4.3.3 Step Activity Data – Key Findings by MOOC

Though the majority of the courses exclusively demonstrate only assimilative and communication steps within the top ten for likes and comments, five of the 19 courses have either experiential, productive or interactive/adaptive learning design activities in the top ten for comments or likes. There were two courses in which one of these latter three learning design activities featured in the top ten for both comments and likes. There were no instances when more than one of the latter three learning design activities featured more than once within a course for comments or likes.

The courses that feature either experiential, productive or interactive/adaptive in the top ten comments and likes are:

- Childhood in the Digital Age
- Forensic Psychology: Witness Investigation
- Get Started with Online Learning
- The Science of Nuclear Energy
- The Science of Nutrition

Of these courses only Get Started with Online Learning and The Science of Nutrition have these learning design activities in both comments and likes. In Get Started with Online Learning there are productive learning design activities in both comments and likes, and in The Science of Nutrition there are experiential activities in both comments and likes. Drawing from the findings in Section 4.1.23, three of the courses listed above were identified in Table 30 as top five MOOCs for overall performance, namely, Forensic Psychology: Witness Investigation, The Science of Nuclear Energy and The Science of Nutrition.

Though, as demonstrated in Table 30, these MOOCs had multiple learning design activity types in their designs, learners only repeatedly engaged with one additional learning type across all the presentations in high volumes. In Forensic Psychology: Witness Investigation the learning design

included productive (3 percent) and interactive/adaptive activities (1 percent), but in the top ten for comments and likes learners only repeatedly engaged through commenting on interactive/adaptive steps which was not replicated with likes. In The Science of Nuclear Energy the learning design included finding and handling information (8 percent) and interactive/adaptive (4 percent), but as with Forensic Psychology: Witness Investigation learners engaged with the interactive/adaptive steps for comments but not for likes in each presentation. The Science of Nutrition was designed to include finding and handling information (2 percent), productive (5 percent) and experiential (4 percent) activities, so may be considered a fairly balanced course in terms of representation of types of learning design activities. Nevertheless, the learners did not repeatedly engage at volume with all these activities with only experiential activities repeating within the top ten for comments and, unlike the other two courses, for likes as well.

The remaining two courses, Childhood in the Digital Age and Get Started with Online Learning, did not feature within Table 31 but that does not mean that they are not engaging. As with The Science of Nutrition, Childhood in the Digital Age had a balance of activities with productive (7 percent) and interactive/adaptive (2 percent). Get Started with Online Learning, unlike the other four courses, was not as balanced with only productive steps (6 percent) in addition to communication and assimilative activities, whereas the other four courses had at least two additional learning design activities. However, Get Started with Online Learning is the only course besides The Science of Nutrition to have an additional learning activity (in this case productive) continually engaged with for both comments and likes at volume across all of its presentations.

In reviewing the remainder of the table the courses with the highest number of learning design activities for the top four for both assimilative and communication learning design activities for comments and likes were isolated.

Table 31: Top Three in Assimilative Learning Design Activities from Table 30

MOOC	Comments					Likes				
	Assimilative	Communication	Experiential	Productive	Interactive/ adaptive	Assimilative	Communication	Experiential	Productive	Interactive/ adaptive
Basic Science: Understanding Numbers (4)	35	5	0	0	0	36	4	0	0	0
Childhood in the Digital Age (6)	44	16	0	0	0	50	8	0	0	2
Start Writing Fiction (6)	41	19	0	0	0	36	24	0	0	0

Table 32: Top Five in Communication Learning Design Activities from Table 30

MOOC	Comments					Likes				
	Assimilative	Communication	Experiential	Productive	Interactive/ Adaptive	Assimilative	Communication	Experiential	Productive	Interactive/ Adaptive
Basic Science: Understanding Experiments (4)	21	19	0	0	0	16	24	0	0	0
Elements of Renewable Energy (4)	7	33	0	0	0	14	26	0	0	0
Forensic Psychology: Witness Investigation (4)	12	25	0	0	3	21	19	0	0	0

Introduction to Cyber Security (8)	0	80	0	0	0	25	55	0	0	0
Start Writing Fiction (6)	41	19	0	0	0	36	24	0	0	0

Though these are the five courses with the highest number of assimilative and communication steps in the top ten steps for each of their respective presentations, none of these four courses are in the top five MOOCs for overall performance (Table 22). This demonstrates that though learners engaged with certain steps repeatedly across all the presentations of that course, the learners did not continue to engage with the course in volume as Active or Returning Learners. Given the number of learners that were attracted to Introduction to Cyber Security that is a surprising finding. Also, within these findings in Table 30, Introduction to Cyber Security continues to be an anomaly as the only course to have only one learning activity type in its top ten steps for all presentations for comments (80 recorded for communication steps). Given that this course has the highest number of presentations with eight complete course runs reviewed, it is a surprising finding that not one assimilative step appeared in the top ten for any of the presentations for comment activity. However, in the likes activity 25 of the 80 steps reviewed as top ten activity were assimilative, demonstrating that learners were engaging with the assimilative steps, in the form of reading and liking pre-existing comments.

Of the remaining courses that feature within Tables 31 and 32 there is a distinct pattern within the learners' engagement with the courses. In each of the courses for both comments and likes the learners demonstrate a strong repeating engagement pattern in which they prefer to predominantly engage with one type of learning activity. For example, in Basic Science: Understanding Numbers the learners preferred to strongly engage with assimilative steps for comments and likes (35 and 36 counts respectively) in comparison to that of communication (five and four counts respectively). This pattern is repeated for Childhood in the Digital Age in comments for assimilative (44) and communication (16) and for likes in assimilative (50) and communication (8). In Introduction to Cyber Security as mentioned above learners preferred to engage with communication steps (80), and predominantly communication steps in likes (55) compared to assimilative steps (25). Start Writing Fiction was the only course in which both assimilative steps (36) and communication steps

(24) were in the top three step frequencies for both learning design activity types for likes, though not in comments with assimilative (41) receiving more counts than communication (19).

Learners on these courses seem to have a strong preference for certain learning design activities, and therefore were attracted to principally engage with those, giving in some cases strong differentials between assimilative and communication step counts (for example Basic Science: Understanding Number and Childhood in the Digital Age).

Alternatively, learners could have found the steps with the highest number of comments more engaging in terms of marking as liked. Common sense would state that in the case of more comments, more likes would be expected but learners may find steps with a high number of comments overwhelming or time consuming to read. In Basic Science: Understanding Numbers there is a strong preference for learners to comment and like assimilative steps (35 and 36 counts respectively) which, when reviewed in conjunction with Table 30 for the identification and classification of Super Steps in Section 4.3.4, shows that for Basic Science: Understanding Numbers there are five instances of Super Steps of which four are assimilative. The same pattern is repeated for Childhood in the Digital Age for assimilative steps and Introduction to Cyber Security for communication steps.

4.3.4 Step Activity Data – Super Steps

Due to the design of the FutureLearn platform and subsequent R report generation, as demonstrated in the preceding sections with regards to the methodology for analysing comments and likes, it is possible to cross-reference this to produce further analysis that for the purpose of this research will be referred to as ‘Super Steps’. The reason for undertaking this activity is to identify which steps learners found most engaging in terms of comments and likes, which also repeated in each presentation of the MOOC. Isolating these steps across each of the presentations defines the steps learners found most engaging regardless of the changes in presentation date and the

population of learners, thereby reliably answering the research question '*What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*'

To generate the identification of the Super Steps, the top ten steps for comments and likes for each of the 76 presentations were reviewed. The top ten steps reviewed in each of the presentations for the course were isolated where the same step registered for both comments and likes. The lists for each presentation were cross-referenced and the repeating steps were identified for classification as Super Steps. For example, if steps 1.10, 2.4 and 4.8 were in the top ten steps for each presentation of the MOOC for comments but only 1.10 and 2.4 were in the top ten steps for each presentation of the MOOC for likes then only 1.10 and 2.4 could be considered Super Steps as 4.8 did not appear in the top ten for every presentation.

Due to the pattern of step visits denoted in Section 4.3.1 being the same for 97.37 percent of the presentations, these 760 steps within the analysis were removed leaving 1,520 top ten steps for likes and comments for analysis. From the examination of the 1,520 steps for comments and likes in total there were 108 steps that repeated in each presentation for comments, and 85 for likes. These steps were then isolated and cross-referenced to reveal that 62 steps were present in both lists. These 62 Super Steps were then mapped against the FutureLearn step taxonomy and learning design to define their learning design activities to identify whether there is a distinct pattern in the type, content or title of the step.

Table 33: Identification and Classification of Super Steps

MOOC title	Step number	Step title	Learning design activity	Step content
Basic Science: Understanding Experiments	4.4	What were your results?	Communication	Discussion
Basic Science: Understanding Numbers	1.2	Water, water, everywhere	Assimilative	Video
Basic Science: Understanding Numbers	1.3	Reflecting on numbers	Communication	Discussion
Basic Science: Understanding Numbers	1.5	How do numbers help test scientific hypotheses?	Assimilative	Article
Basic Science: Understanding Numbers	1.6	Is homeopathy science?	Assimilative	Article
Basic Science: Understanding Numbers	1.8	Scientific notation	Assimilative	Video
Challenging Wealth and Income Inequality	1.8	Inequalities in the UK: perception versus reality	Communication	Discussion
Challenging Wealth and Income Inequality	1.18	Inequality between age groups over time	Communication	Discussion
Childhood in the Digital Age	1.2	A family discussion	Assimilative	Article
Childhood in the Digital Age	1.3	From zero to eight	Assimilative	Article
Childhood in the Digital Age	1.4	A moral panic?	Assimilative	Article
Childhood in the Digital Age	1.7	Introducing ‘digital natives’	Assimilative	Article
Childhood in the Digital Age	1.9	Is there really a generational divide?	Communication	Discussion
Elements of Renewable Energy	1.2	What is renewable energy?	Assimilative	Article
Elements of Renewable Energy	1.9	World energy supply and demand	Communication	Discussion
Elements of Renewable Energy	1.12	EU and UK renewable energy prospects to	Communication	Discussion

Elements of Renewable Energy	2.6	Factors effecting total energy generated	Communication	Discussion
Elements of Renewable Energy	2.11	Public attitudes and planning	Communication	Discussion
Forensic Psychology: Witness Investigation	1.9	The size of the project – the Innocence Project	Communication	Discussion
Forensic Psychology: Witness Investigation	2.11	Summary of the evidence	Communication	Discussion
Forensic Psychology: Witness Investigation	2.17	Comparing the evidence	Communication	Discussion
Forensic Psychology: Witness Investigation	4.5	DI Bullet's evidence	Communication	Discussion
From Notation to Performance: Following a Musical Score	1.2	Types of musical score	Communication	Discussion
From Notation to Performance: Following a Musical Score	1.3	How do musical scores work?	Assimilative	Article
From Notation to Performance: Following a Musical Score	1.4	Some things notations do	Assimilative	Article
Get Started with Online Learning	1.8	Online teaching materials	Communication	Discussion
Introduction to Cyber Security	1.7	Describing cyber security breaches	Communication	Discussion
Introduction to Cyber Security	1.16	Securing my digital information	Communication	Discussion
Introduction to Cyber Security	3.18	Keeping up to date	Communication	Discussion
In the Night Sky: Orion	1.13	Name a constellation	Communication	Discussion
In the Night Sky: Orion	4.25	Life beyond the Solar System?	Communication	Discussion
Managing My Investments	1.6	Savings and the life course	Communication	Discussion

Managing My Investments	1.7	Savings behaviour in the UK	Communication	Discussion
Managing My Investments	1.14	Why aren't we saving and investing more?	Communication	Discussion
Managing My Money	1.4	The life course	Assimilative	Article
Managing My Money	1.5	The life course game	Communication	Discussion
Smart Cities	1.2	What is a smart city?	Assimilative	Article
Smart Cities	1.4	Milton Keynes and MK Smart	Assimilative	Video
Smart Cities	1.5	Songdo	Assimilative	Video
Smart Cities	1.7	How do they compare?	Communication	Discussion
Smart Cities	1.18	How should smart cities develop?	Communication	Discussion
Start Writing Fiction	1.4	Fact and fiction	Communication	Discussion
Start Writing Fiction	1.11	Developing a character from your notebook	Assimilative	Article
The Business of Film	1.2	Cultural and economic value of film	Communication	Discussion
The Business of Film	1.4	Value and the creative and cultural industries	Assimilative	Article
The Business of Film	1.7	Money spent by inward investment films	Assimilative	Article
The Lottery of Birth	1.3	What do we mean by the lottery of birth?	Assimilative	Article
The Lottery of Birth	1.4	The world's 7 billionth baby	Communication	Discussion
The Lottery of Birth	1.5	Thinking point: check your privilege	Assimilative	Article
The Science of Nuclear Energy	1.12	Precise doses of radiation	Communication	Discussion
The Science of Nuclear Energy	1.15	Ideas about radioactivity	Communication	Discussion

The Science of Nuclear Energy	3.5	Errors	Communication	Discussion
The Science of Nuclear Energy	4.19	What are your views on nuclear power?	Communication	Discussion
The Science of Nutrition	1.2	Why do we eat?	Communication	Discussion
The Science of Nutrition	1.3	What are the reasons for eating?	Assimilative	Article
The Science of Nutrition	1.4	Grehlin	Assimilative	Article
The Science of Nutrition	1.5	The components of food	Assimilative	Article
The Science of Nutrition	1.6	Protein	Assimilative	Article
World War 1: Trauma and Memory	1.2	Injuries of First World War	Assimilative	Video
World War 1: Trauma and Memory	1.3	Physical injuries	Assimilative	Article
World War 1: Trauma and Memory	1.7	Introducing shell shock	Assimilative	Video
World War 1: Trauma and Memory	1.10	Discussing shell shock	Communication	Discussion

From the table above, it is noted that 16 of the 62 steps identified as Super Steps have questions posed in the step title which equates to 25.81 percent of the Super Steps reviewed. From these findings learners are attracted to steps which seem to require them to give their opinion rather than explicitly test of their knowledge (though asking an opinion is the reinforcing of pre-existing knowledge). Of the steps with questions posed in the titles 50 percent are communication and 50 percent are assimilative (of which all were articles). Collectively of all courses combined 198 of the 1,847 steps posed a question in the step title. This equates to 10.72 percent of step titles, demonstrating that the finding of 25.81 percent of Super Steps with question marks posed in the title is significant. When applying a Chi Square Test to these findings $p < 0.0001$ so therefore these findings are significant.

In reviewing of the step number, 83.87 percent of the steps in Table 33 are within Week 1 of the course, 6.45 percent are within Weeks 2 and 4, and 3.23 percent are within Week 3. Though a number of the MOOCs reviewed for this research are more than four weeks in length, none of the Super Steps identified are located within any steps beyond Week 4. Due to the reported dropout rates of MOOCs it is hardly surprising that the first week is the most engaging, but the pattern of Super Steps does not follow the stereotypical graduating decline of MOOC learner engagement as the number of Super Steps located in Week 4 is greater than that in Week 3. There are four Week 4 steps in comparison to one Week 3 step. Of the four Week 4 steps, three of the step titles pose a question to engage the learner into visiting the step and all four steps are communication steps. The four steps derived from four different MOOCs with three of the courses categorised as Science, Maths and Technology in the FutureLearn classification system. The one Week 3 step identified was located in Introduction to Cyber Security and entitled ‘Keeping up to date’. Given the nature of the course, this would be a step learners would engage with to ensure they are able to maintain relevant knowledge on the subject. As with the four Week 4 Super Steps identified, the Week 3 step was also

a communication step. Given the focus in literature on the gradual decline within MOOCs (Jordan, 2014; Jordan, 2015) this is a new contribution.

All the Super Steps categorised in this research were either assimilative (43.55 percent) or communication (56.45 percent) even though productive, interactive/adaptive and experiential were identified within the top ten steps for likes and comments separately. There are two possible reasons: firstly, due to the low percentages of these latter learning design activity types, the probability of being able to cross-reference them for comments against likes within all presentations for their related courses is fairly low; and, secondly, learners prefer to engage with assimilative and communication steps. A further review of the content within the steps reveals that 56.45 percent are discussion-based activities, 33.87 percent are articles (text-only steps) and 9.68 percent are videos.

These findings were reviewed in conjunction with the data from the learning design engagement survey outlined in Section 3.4.2 that was distributed to a sample of 500 learners from each of the 19 MOOCS. Of the 9,500 survey invites despatched to the random sample of learners, 1,800 responses were received with a response rate of 18.95 percent.

Table 34: Learning Design Engagement Survey Responses

Title	Number of responses	Response rate (%)
Basic Science: Understanding Experiments	92	18.4
Basic Science: Understanding Numbers	141	28.2
Challenging Wealth and Income Inequality	111	22.2
Childhood in the Digital Age	97	19.4
Elements of Renewable Energy	82	16.4
Forensic Psychology: Witness Investigation	71	14.2
From Notation to Performance: Following a Musical Score	131	26.2
Get Started with Online Learning	61	12.2

Introduction to Cyber Security	92	18.4
In the Night Sky: Orion	128	25.6
Managing My Investments	114	22.8
Managing My Money	62	12.4
Smart Cities	60	12
Start Writing Fiction	72	14.4
The Business of Film	72	14.4
The Lottery of Birth	111	22.2
The Science of Nuclear Energy	125	25
The Science of Nutrition	76	15.2
World War 1: Trauma and Memory	102	20.4
Total Responses for all MOOCs	**1,800**	**18.95**

In the survey learners were asked two questions: '*What parts of a course do you enjoy the most? (tick all that apply)*' and '*What parts of a course do you enjoy the least? (tick all that apply)*' (see Appendix 1). In the responses 74.75 percent of learners enjoyed videos and 70.62 percent enjoyed articles. Learning activities received 50.30 percent of the responses and interactives received 24.65 percent. Given that 50 percent of the Super Steps were communication it is notable to find that only 36.22 percent enjoyed discussions/forums (the term forum was used in the survey as learners in the Initial Study referred to the comments section as 'forums'). Conversely when reviewing the responses for what learners enjoyed the least in courses, discussion/forums received 36.54 percent of responses, whilst the remaining activities such as videos (6.44 percent), articles (8.34 percent), learning activities (3.86 percent) and interactives (9.15 percent) received much lower scores demonstrating that they were enjoyed within the courses, whilst the response to whether learners enjoyed or did not enjoy discussions/forums remains split.

4.4 Discussion of All Findings

This section draws together the findings from Sections 4.1.23 (Summary of MOOC Learning Designs and Performance Data), 4.2.4 (Survey Responses – Summary of Findings) and 4.3.5 (Step Activity Data – Summary of Findings) in relation to the literature to ascertain whether the following research questions were addressed:

1. *Why do learners engage in massive open online courses (MOOCs)?*
2. *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

Section 4.2 addressed the first research question, whilst Section 4.3 addressed the second research question. In both sections the data associated with the relevant research question was analysed by MOOC, by subject and collectively by all MOOCs. This multi-perspective view of the data had not been witnessed within the literature review of this study. This may be due to the majority of the studies in the literature being able to access only a small number of courses. Where a larger number of courses was available for review (see Jordan, 2014; Jordan, 2015) the analysis was not presented in this manner, so this alternative view on the data is new.

4.4.1 The First Research Question

The first research question asks:

> *Why do learners engage in massive open online courses (MOOCs)?*

This question was formed as a result of a gap in the literature in analysing large-scale MOOC data from a single university provider. The literature reviewed for this study was either from a small dataset or from a large dataset derived from MOOCs created by a number of providers. Young (2013) stated that learners viewed MOOCs as a hobby or a pastime, and therefore they are perceived to be educational entertainment. Both Agarwal (2012) and Breslow et al. (2013) cited that learners engaged with MOOCs for personal satisfaction, though some were extrinsically motivated

to obtain skills for professional practice or gain a form of MOOC certification as recognition. Hew and Cheung (2014) listed four reasons to enrol: curiosity, collection of MOOC certification, personal challenge and desire to learn.

To address the research question effectively, the analysis of 120,842 beginning-of-course survey responses to the question *'Why are you interested in studying this course? (tick all that apply)'* was carried out. This survey was sent within an email at the beginning of each MOOC presentation reviewed in this study, and therefore to 800,038 Joiners. This provided a response rate of 15.10 percent. Analysis of the data displayed within Table 29 established that there was no distinct pattern in the response rate in conjunction with the FutureLearn taxonomy for subject categories. These findings demonstrated that learners were no more or less likely to complete the beginning-of-course survey in relation to how the course performed in terms of engagement.

At this point the data analysed provides a new contribution to academic literature. The findings are similar to that of Agarwal (2012), Breslow et al. (2013), Hew and Cheung (2014) and Young (2013). The most-selected response of 'Personal interest' (87.3 percent) was followed by 'Professional development' (34.8 percent) ranked second collectively, and curiosity (Hew and Cheung, 2014) may be perceived in 'Personal interest' and 'To find out more about FutureLearn or MOOCs in general' (10.2 percent). The contribution is new, not within the top-level data reported but in the data analysed by subject and by individual MOOC. Providing such a large-scale dataset to reinforce the findings made by Agarwal (2012), Breslow et al. (2013), Hew and Cheung (2014) and Young (2013) could be deemed a large scale confirmation of previous findings, especially when reviewed in conjunction with the by subject category.

In reviewing the survey responses for the top five MOOCs identified in Section 4.1, the highest response, received for 'Personal interest', was as follows:

- In the Night Sky: Orion (97.8 percent)

- World War 1: Trauma and Memory (92.5 percent)
- The Science of Nutrition (89.7 percent)
- Forensic Psychology: Witness Investigation (86.3 percent)
- The Science of Nuclear Energy (85.5 percent).

Only five of the 19 MOOCs recorded below 80 percent for 'Personal interest' (see Table 25). A possible theory as to why MOOC engagement is at present not as high or sustainable as universities and platform providers may like is learners' strong desire to predominantly learn for personal rather than professional or formal academic interest. Therefore, learners are only selecting the parts of the course that are of interest to them on a personal level and not following the traditional linear journey that academics are more experienced in designing, resulting in a rather 'square peg, round hole' predicament in which learners have developed a 'pick and mix' mentality to learning in a domain designed around traditional linear courses (Hirst, 2009; Gore, 2016). This has resulted in academics and universities being despondent at MOOC drop-off rates and the learners not experiencing their fulfilling of their learning needs in this manner as disengagement with the course (Gore, 2016).

Though Thrift (2013) suggested that MOOCs are used by middle class families to offset the rising costs of education, the findings within Table 25 demonstrate that only 11.6 percent found the 19 MOOCs to be relevant to their current studies and 17.8 percent relevant to preparation for future study. Of the responses 9.2 percent stated that they were attracted to MOOCs to see whether or not they could study at this level. Lower still, 8.7 percent wanted to find out more about the OU. Whilst there may be some cases of learners utilising MOOCS as additional resources in their formal studies, it definitely does not equate to the 87.3 percent of responses that selected 'Personal interest'. Of the five courses that ranked highest in terms of relevance to current and future studies, three were categorised by FutureLearn as subject type Science, Maths and Technology. Conversely, the course that was expected to record the highest in association with formal study (Get Started with Online

Learning) recorded the lowest for 'Personal interest' (67.7 percent), demonstrating that learners do engage with MOOCs for specific purposes.

Both Agarwal (2012) and Breslow et al. (2013) found that some learners engaged with MOOCs to obtain professional skills. The responses for 'Professional development' and 'Relevant to my work' were analysed in light of this literature. The four MOOCs that recorded the highest responses for 'Professional development' also recorded the highest for 'Relevant to my work', demonstrating a link between learners' day-to-day work and advancement in their careers. Of these courses – Smart Cities, The Business of Film, Introduction to Cyber Security and Childhood in the Digital Age – only two feature within the same subject category on FutureLearn, namely, Introduction to Cyber Security and Childhood in the Digital Age being categorised within Online and Digital. Whilst the analysis shows findings in relation to Agarwal (2012) and Breslow et al. (2013), the literature reviewed does not show findings for professional development in conjunction with course subject type.

In response to the research question, and supported by the literature reviewed, learners across all the MOOCs analysed have a strong propensity to engage with MOOCs for personal interest, regardless of the subject they are registered on. Whilst learner interest in free courses is at the heart of the ethos of OERs, in terms of MOOCs this level of personal interest does not sustain engagement throughout a course to complete engagement as demonstrated in data by Jordan (2014 and 2015). The findings within this thesis demonstrate that, whilst the reasons for learners engaging with MOOCs can be predicted collectively, they cannot be predicted based on subject category, the number of categories the courses are listed in, the number of Joiners or Learners that engage with the course, the survey response rate or the nature of the course content. However, within the findings, regardless of subject category, learners are enrolling in MOOCs primarily for personal interest with relevance to professional or academic development as a lesser reason. Literature on

use of MOOCs for engagement in association with subject type and categorisation could not be located, and therefore the findings in Section 4.2.1 and 4.4.1 are a new contribution.

4.4.2 The Second Research Question

The second research question asks:

> *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

This question was identified due to the gap found between engagement with learning design as a definition and MOOC learning design. The OU MOOCs followed the principles of learning design as identified by Conole and Weller (2008) and took into account the six beneficial reasons for adopting a learning design approach described by Conole (2010). Research into the learning design field has begun (Rienties et al., 2015), but the literature reviewed demonstrated no significant research had been conducted on the learning design of MOOCs as a whole entity in the same systematic manner. Literature has been published on elements of learning design, with Guo et al. (2014) and Seaton et al. (2013) focussing on engagement with videos, Ferguson and Clow (2015 and 2016) and Ferguson et al. (2015) conducting research on engagement within content and comments regarding content and assessment, and Kizilcec et al. (2013) focussing on engagement within content and associated assessment. Most literature found regarding engagement preceded MOOCs in more formal classroom settings and so the learning design would be different as would the engagement with the course. In this study, providing a systematic review of 76 presentations of 19 MOOCs, the findings of which address the second research question, is a new contribution.

As demonstrated in the literature there is a growing field of research questioning the significance of completion data in association with MOOCs (Haggard, 2013). Kizilcec et al. (2013) found that learners wished to engage but had no intention of completing. Wang and Baker (2014) demonstrated that learners were selective, choosing instead to select particular topics to engage

with rather than the course in its entirety. This view was supported by Hirst's (2009) view of 'uncourse' with learners not undertaking the course in the manner in which it was designed, and instead of a linear path opting for a 'pick and mix' approach to learning (Gore, 2016). These theories demonstrate evidence of autonomy (Mackness et al., 2010) and self-directed learning (Belz and Muller-Hartman, 2003) and were demonstrated in the analysis of the new theory of 'Super Steps' within this thesis. Though the number of visits to steps followed the same gradual decline as demonstrated by Jordan (2014 and 2015), engagement with the content in terms of comments and likes did not entirely fit the same pattern.

In the analysis of the Super Steps, it was found that 6.45 percent were in Week 4 in comparison to 3.23 percent being in Week 3. Had the gradual decline, as demonstrated in the literature, been followed, these percentages should have been reversed. Instead there were four Super Steps identified in Week 4 steps in comparison with one Week 3 step. All of the Week 4 steps identified were communication steps, of which three posed a question in the step title. The step in Week 3 was also a communication step entitled 'Keeping up to date'. These five steps collectively demonstrate the concepts identified by Hirst (2009) and Gore (2016) in that the learners do not follow the linear path set by the educator and that learners were being selective with their learning as Wang and Baker (2014) suggest. Learners engaging with learning design out of sync with the course also demonstrates supporting evidence of self-directed learning (Belz and Muller-Hartman, 2003) through autonomy (Mackness et al., 2010).

This type of engagement with learning design could not be replicated in the literature as much of the focus of engagement is within a formal classroom setting whereby the learners do not have the autonomy to skip elements of practice-based learning to content they are more motivated to engage with (Young, 2013; Coffrin et al., 2014). Therefore, the definition of student engagement as cited by Fredricks et al. (2004) could not be wholly applied in this context. This is a significant contribution in terms of learning design for MOOCs, as educators who are familiar with traditional student

engagement concepts cannot wholly apply that knowledge within a MOOC setting. Even the concept of learners engaging in MOOCs with no intention of completing (Kizilcec et al., 2013) would be new to them when considering creating a MOOC.

Drawing from the literature by Kizilcec et al. (2013) and the findings of the Initial Study, the intention not to complete may be, in some cases, a subconscious rather than conscious one. Section 3.2 gave details of the findings of the Initial Study with Section 4.3 making reference to them. Learners interviewed for the Initial Study had not completed the course that had presented two years prior to interview but, when questioned, did not see themselves as dropping out, disengaging, quitting or failing the MOOC. All that were questioned on this topic stated that they had engaged with the course to meet their needs and in some cases added that they had plans to return to the course at a later date. Given the difference of emphasis and accountability of attendance of MOOCs in comparison to a traditional classroom, though a learner may have ceased to engage in terms measured by MOOC providers (Jordan, 2014 and 2015), learners themselves may have only subconsciously failed to complete the course, until consciously reminded of it. These findings are new contributions to the field as, though the concept of engaging to completion is not new (Haggard, 2013; Kizilcec et al., 2013; Wang and Baker, 2014), the concept of how the learners engage both subconsciously and consciously is new, as is the evidence to support Hirst (2009) and Gore (2016) regarding Super Step engagement found in contradiction to the gradual decline identified by Jordan (2014 and 2015).

The development of the Super Steps in conjunction with the learning design engagement survey addresses the heart of the second research question, identifying the elements of learning design that learners engage with most. The collective review of the top ten steps for comments found that 59.19 percent of the steps were assimilative, 38.99 percent were communication, 0.42 percent were interactive/adaptive while experiential and productive scored 0.70 percent each. Using the same methodology for likes, 58.88 percent were assimilative, 40.30 percent communication, 0.41 percent

productive, 0.27 percent interactive/adaptive and 0.14 percent experiential. When analysed in conjunction to produce the data for Super Steps the findings generated 62 steps that comprised 43.54 percent assimilative (of these 21 steps 16 were article steps and five were video steps) and 56.46 percent communication. Drawing on the findings of the learning design engagement survey when learners were asked '*What parts of a course do you enjoy the most? (tick all that apply)*', 70.62 percent of the responses stated that they enjoyed articles. Conversely, though not reflected in the Super Steps, 74.75 percent of responses stated they enjoyed videos. Whilst this may be true, the enjoyment of a video does not necessarily mean that the learner will then engage further with the video by engaging with the discussion on the step through either commenting or liking comments. Of the learning design engagement survey responses only 36.22 percent enjoyed discussions/forums and when reverse questioned about what they enjoyed the least, discussions/forums received 36.54 percent of the responses. However, given that 50 percent of the Super Steps are communication, this is not reflected in the data.

Building on the literature by Nonnecke and Preece (2001) and Milligan et al. (2013) the analysis of the use of likes within this study can help to define lurking in a new context. In the literature, Ramesh et al. (2013) classified learner engagement within MOOCS in three categories: active engagement, passive engagement and disengagement. Within the literature review the concept of lurking as a developed form of 'disengagement' was discussed, using the definition of lurking by Nonnecke and Preece (2001). In review of the learners' activity through likes made, and in conjunction with the theories surrounding surface-level processing (Biggs, 2001; Tagg, 2003), it is possible that learners engaging by liking a comment are bridging a gap between engagement and disengagement through 'active lurking'. Previously in the literature reviewed lurking had a single definition, though in reviewing the data it could be defined as being passive lurking (reading with no interaction) and active lurking (reading with action through acknowledgement of a like). Given the propensity within these MOOCs for learners to post a like to a comment and therefore potentially

see themselves as engaging with the course, 'active lurking' must be considered as a form of engagement with learners preferring to actively lurk on assimilative steps (58.88 percent) and communication steps (40.30 percent), though some learners may comment in addition to liking on a step.

An element of learning design that is not found within the literature is that of the use of step titling. Much emphasis of the literature has been on the concepts of learning outcomes (Thorpe, 2006; Conole and Weller, 2008), reasons to adopt a learning design approach (Gibbons and Brewer, 2005; Conole, 2010) and learning design taxonomy (Conole, 2010; Rienties et al., 2015). However, Winograd (1996) stated that design is an organic activity that develops and evolves over time, describing design as a dialogue with materials. In the context of MOOCs on FutureLearn and the use of steps with titles in their web design, the dialogue of titling of steps must now be included. This draws from Conole's concept (2008) of the course view map whereby learners are using the step titles to navigate what elements of the course to engage with as a form of course overview (Harrison, 1994). Through the use of step titles learners are able to be more selective about what they engage with, and this selection of elements is found within the literature (Kizilcec et al., 2013; Wang and Baker, 2014; Gore, 2016), but not in the context of step titling. Whilst the use of step titling as a form of learning design may change a learner's 'flow' (Csikszentmihalyi, 1975), it does reinforce the concept of providing an environment for autonomy (Mackness et al., 2010) and self-directed learning (Belz and Muller-Hartman, 2003).

The analysis found that in terms of step titles, 16 of the 62 Super Steps identified have questions posed within the step title to attract learners to engage with the content. This equates to 25.81 percent of the Super Steps reviewed. These findings demonstrated that learners were attracted to steps that encourage them to give an opinion. There was an equal split between steps that were communication and assimilative (all of which were articles), demonstrating that the use of questions within a step title can be utilised on more than one element of learning design taxonomy. The

integration of titling of steps to encourage engagement with elements of learning design is a new contribution to research.

In response to the research question, and supported by the literature reviewed, the elements of learning design that encourage learner engagement are mostly assimilative and communication. As demonstrated in the analysis of the data and learning designs this may be due to these learning design elements being predominant in the learning design of the MOOCs. Through the analysis of Super Steps derived from the ability of the FutureLearn platform to record both comments and likes, and due to the number of presentations the MOOCs analysed have had, new contributions to this question have been made. The findings within the Super Steps denote that learners are more likely to engage with communication steps (56.46 percent) than assimilative steps (43.54 percent) and of these assimilative steps the learners are more likely to engage with articles than videos. The learners also engage with learning design outside of the context of the linear journey prescribed by the educator, with findings of 6.45 percent of Super Steps being in Week 4 in comparison to 3.23 percent of Super Steps in Week 3. This finding is in direct contradiction of the literature denoting all MOOCs demonstrate a gradual decline in engagement each week. Finally, providing a new contribution to learning design through the analysis of step titles as learners are more likely to engage with a step (regardless of the learning design taxonomy) if the step poses a question within the title to entice the learners to engagement through encouraging them to give their opinion rather than explicitly test of their knowledge. This was demonstrated with 25.81 percent of the Super Steps having questions posed within the step titles, in comparison to 10.72 of step titles with questions in step titles in courses overall.

Chapter 5: Conclusions

This thesis proposed to address the research questions as to why learners become engaged in MOOCs and which elements of learning design encourage engagement. In this final chapter conclusions will be drawn as to the benefits and limitations of the study, how the research questions were addressed and the conclusions drawn, the contribution to knowledge that this thesis provides and how future research will be undertaken.

5.1 Limitations of the Study

This study was a large and complex one. Holding the role of Senior Producer: MOOCs at the OU aided me in providing further context for the study. Though multiple universities and institutions globally have produced and hosted MOOCs, the OU has a high number of MOOCs in comparison to other MOOC providers. In this research 19 MOOCs that were created, produced and presented by the same team within several departments at the University and that presented a combined total of 76 times were reviewed. A larger set of MOOCs created in such a manner by the same team is not known (thus providing consistency in comparison of learning design) but the study is not without its limitations.

The definition hypothesis for the study was outlined in Section 1.8, where the four P's of optimum learner engagement with MOOCs were described, namely, platform, population, presentation and pedagogy. The limitation of this research was that only one of these four elements could be examined as pedagogy was controlled solely by the OU whereas platform, presentation and population were elements controlled by FutureLearn. Whilst the study could not provide a holistic view of all of the four elements within the definition hypothesis, it was in the position to test the element of pedagogy through the review of 19 MOOCs.

Though the OU had produced 48 MOOCs from 1 August 2013 to 1 January 2017, totalling 119 presentations, these were not all designed by the IET with the MOOCs being designed in the

academic year of 2015/16 by the Technology Enhanced Learning team in the Learning Translation Innovation department at the University, and the MOOCs designed in the academic year of 2016/17 being led in learning design by the Senior Producer: MOOCs in the Open Media and Informal Learning department based on the learning design frameworks of IET and within this thesis. Though IET led the learning design in the academic years of 2013/14 and 2014/15, only the MOOCs in the academic year of 2014/15 were selected. This was due to the stabilisation of the FutureLearn platform post-launch (November 2013) as the MOOCs created in 2013/14 were being designed in the absence of a beta platform and were retro-fitted to the platform as features were developed prior to and after launch. Therefore, a limitation of the study was that more MOOCs could have been selected for analysis had there been a stabilisation in both technical and human resources to allow for consistency in the learning design of each of the MOOCs. However, even with this limitation to the study, usually research within the same field of MOOC learning design and performance to this scale is selected for comparison from different teams within a number of universities, thus preventing a consistency in approach.

A further limitation of the study was that the scope of the MOOCs analysed was the presentation solely on the FutureLearn platform. Though the OU syndicates its MOOCS additionally to the OpenLearn platform, at the time of the study not all the MOOCs had been presented on OpenLearn, this being a limitation within the data that the OpenLearn platform could mitigate. As OpenLearn is a platform without social engagement, the courses are retrospectively adjusted in terms of pedagogy to fit the platform's criteria. This would have provided additional insight into the engagement within the courses if the social learning element had been removed, and addressed the speculation as to the impact of social learning and discussion as a significant engagement factor within the learning design of MOOCs.

5.2 Addressing of Research Questions

This thesis proposed to address the following research questions formed from the literature review, whereby a gap was identified as to the lack of literature relating directly to engagement within MOOCs and the subsequent impact on learning design. Though there is a growing field of literature relating to learning design, this is largely in the context of formal study towards modules and qualifications and no collective significant research had been conducted to date on the engagement and learning design of MOOCs in a similar manner. Though the population of MOOCs is a large and heterogeneous one, and though MOOCs have yet to provide subsequently significant returns of investment for either the universities or the platform providers, there is a usefulness to the understanding of how such a large population engage with learning materials to subsequently understand how this can impact on the future of learning design within formal modules and qualifications.

The research questions that this thesis addressed were:

1. *Why do learners engage in massive open online courses (MOOCs)?*
2. *What elements of the design of massive open online courses (MOOCs) encourage learner engagement?*

Addressing these research questions explored the issues with engagement and the subsequent impact on learning design. The first research question addressed specifically the reasons for engagement with MOOCs. Answering this was achieved through the analysis of survey responses sent to 800,038 enrolled learners (Joiners) before the presentation of each course. If a learner had joined multiple OU MOOCs they would have received an email containing a link to each individual survey unique to that course's presentation, so it was possible for a learner to potentially respond to more than one survey for each of the 76 presentations. Given the range of subjects presented by the OU as MOOCs it is possible that a learner could have different reasons for learning each MOOC, for

example for Start Writing Fiction it may be personal interest, but for Managing My Investments it may be professional interest.

To address the first research question the responses within the survey to the question '*Why are you interested in studying this course? (tick all that apply)'* were isolated. The results were collated and organised per presentation, per MOOC, collectively by subject category type (identified by FutureLearn's categories) and collectively overall. The purpose of the organisation of this collation was to identify whether learners had varying interests in studying depending on the individual MOOC and subject category, and to identify a pattern of interest in MOOCS overall at a top level.

Of the 800,038 Joiners that enrolled on the MOOCs prior to course start, 120,842 responses were received at a rate of 15.10 percent. This volume and response rate was deemed reliable enough in scale to draw meaningful data from which to address the research question.

Analysis of the data demonstrated that there was no distinct pattern as to the response rate in conjunction with the categories in which the MOOCs were listed within the FutureLearn platform. The MOOCs that received a higher than 15.10 percent response rate were not predominantly categorised in a particular subject field.

Of the responses received 87.9 percent stated that the reason for enrolling on the MOOC was personal interest. Given this percentage equates to 106,256 learners, the conclusion can be drawn that the predominant interest of the demographic surveyed was that of personal interest, especially given that the secondary reason of the course being free had a 52.8 percent differential, scoring 35.1 percent in comparison. Conversely some of the responses that received the lowest number of selections in terms of percentage were 'To find out more about The Open University' and 'To find out if I can study at this level'. From these lowest responses recorded it is clear that learners are not necessarily interested in using MOOCs for sharing of information or for further formal study at the OU. In addition only five of the 19 MOOCs recorded 'Professional development' as the secondary

interest to ‘Personal development’, again demonstrating that the learners across all the MOOCs are very focussed on learning MOOCs for personal interest, regardless of the subject they are registered on. Whilst personal interest may initially attract learners to a MOOC, it may not sustain interest in the form of engagement throughout the MOOC, especially if the learners are extrinsically motivated, given that ‘The course was free’ registered at the same frequency of responses as ‘Personal interest’. Therefore, it is possible, given that learners are predominantly registering for personal interest, that they are only selecting the parts of the course that are of personal interest to them and therefore the traditional linear course journey may not apply to MOOCs with learners possibly developing a ‘pick and mix’ mentality to learning in this domain. There was also not a distinct pattern in the courses to suggest that MOOCs from certain categories in particular are more or less likely to attract learners for professional development given the range of categories that the 19 MOOCs represent. In the application of standard deviation to the survey findings (Table 26) there were 4 courses that resulted in a positive standard deviation with regards to the professional development survey responses, of which three of the courses contained content regarding the future of technology and educational technology, though were not categorised within the same field within the FutureLearn subject taxonomy.

Therefore, in conclusion to addressing the first research question, due to the large heterogeneous population of MOOC learners, attraction to a course cannot be predicted based on the category in which the course is listed or marketed on FutureLearn, the number of categories a course is listed in, the number of Joiners or Learners within a course responding to the survey or the nature of the course, for example Creative Arts and Media in comparison to Business Management or Science, Maths and Technology. What is clear from the findings is that, regardless of the subject or the category, learners are enrolling on MOOCs predominantly for personal interest with lower percentages engaging with the MOOCs in relevance to formal study.

In addressing the second research question, the conclusions drawn were more complex than with the first research question. This was due to the large volume of data that had to be collated and systematically sorted from which analysis was drawn and conclusions sought, as the research question addressed engagement rather than disengagement, with analysis of the performance of the top ten steps in all the MOOC presentations. Of the 800,038 Joiners, 425,780 became Learners by accessing the course presentation once the MOOC was live, thus engaging with the content. Engagement with the steps within the presentations was analysed against three markers (step visits, comments and likes). The use of multiple markers with such a high volume of learners across 76 presentations over a three-year period would be reliable enough for meaningful conclusions to be drawn.

Though the analysis of the top ten steps was insightful, the unique nature of this study allowed for the identification and isolation of 'Super Steps' in terms of engagement whereby the steps that were repeatedly in the top ten for every presentation for both likes and comments were isolated, cross-referenced, identified as to their learning design activity and mapped onto the FutureLearn taxonomy. Conclusions as to what makes a 'Super Step' could then be drawn as, from the examination of the 1,520 steps for comments and likes in total, there were 108 steps that repeated in each presentation for comments and 85 for likes. These steps were then isolated and cross-referenced to reveal that 62 steps were present in both lists. It was identified that 25.82 percent of the steps posed questions within their step title meaning that it is possible that learners are attracted to steps which seem to require them to give their opinion rather than explicitly test their knowledge. In addition 83.87 percent of the Super Steps were set within Week 1 of all the courses, with none of the Super Steps located within any steps beyond Week 4. All the Super Steps categorised in this research were either assimilative (43.55 percent) or communication (56.45 percent) even though productive, interactive/adaptive and experiential were identified within the top ten steps for likes and comments separately. A further review of the content within the steps

reveals that 56.45 percent are discussion-based activities, 33.87 percent are articles and 9.68 percent are videos.

For the second research question conclusions can be drawn that learners have a strong preference for assimilative and communication learning activities, but this may be due to the predominantly high number of assimilative and communication steps in the courses. It also seems that posing questions acts as a draw for learners to access the steps instead of a descriptive title as to the content within. As to the learning design, in terms of the length of the course, the majority of Super Steps were within the first week of each of the courses. It is possible to conclude that this is due to the dropout rate of MOOCs that leads to a natural disengagement with the course content rather than an active dislike or disengagement. However, due to the 'pick and mix' nature to the learners' selection activities, this study concludes that further research could be identified into the creation and testing of one-week MOOCs that learners select from a suite of MOOCs that are designed specifically to be one week in length rather than a four-week MOOC being chunked into four separate courses by default. As learners are enrolling in MOOCs for personal interest and seem to demonstrate a 'pick and mix' pattern to their engagement within MOOCs (as demonstrated by the scattering of Super Step and top ten step types), it may be possible that engagement could increase if learners were able to fill an empty-box, four-week framework (as an example length) with four MOOCs of one week that were of interest to them.

5.3 Contribution to Knowledge

Due to the high number of MOOCs produced by the OU, the study was able to investigate at large scale the attraction to the engagement with MOOCs (first research question) and which elements of learning design engages learners within the course (second research question).

Though a wide range of literature has been published to date on MOOCs, engagement and learning design, gaps were still identified within the literature (Section 2.6) from which research questions were formed (Section 2.7). Contributions to knowledge, practical and theoretical, were evident in

the analysis and discussion of findings, and for the purposes of clarity are addressed in the following two sections.

5.3.1 Contribution to Knowledge – Practical

For a contribution to be practical, the findings from this thesis must determine how MOOC creators can develop more-engaging MOOCs moving forward. One of the contributions of this thesis is the large scale analysis of learning design of MOOCs by a single source university provider. To provide a practical contribution, the data for both research questions were analysed systematically to produce findings overall, by subject and by individual MOOC across multiple presentations.

In terms of the first research question the study provided a practical contribution in the analysis of 120,842 beginning-of-course survey responses from a single MOOC provider and in the systematic analysis to produce findings overall, by subject category and by individual MOOC. Previous literature by Agarwal (2012), Breslow et al. (2013), Young (2013) and Hew and Cheung (2014) had a tendency to group findings overall when multiple MOOCs were analysed or by individual MOOC when a single data source was available. Absent from the literature is the combining of datasets from multiple MOOCs that can then be separated out by subject category and by single MOOC from the same beginning-of-course survey question. Due to the absence of large datasets being available for analysis, researchers are reliant on the collation of several publications to provide a response to this question. However, unlike this contribution, the datasets were originally collated from multiple sources, over different periods of time, and pose different forms of the question to the learners. Slight differences in the way the question is put to the learner can change the outcome of the question, making this single-source contribution more reliable.

Another practical contribution is in terms of the use of MOOCs in conjunction with formal study. Thrift (2013) found that middle class families used MOOCs to offset the costs of education. However, the findings from this study suggest that only 11.6 percent found the MOOCs analysed to be relevant to their current studies, and 17.8 percent relevant to preparation for future studies. Those enrolled

on MOOCs to see if they could study at this level stood at 9.2 percent and, lower still, 8.7 percent engaged with MOOCs to find out more about the OU. A causal link was found between 'Professional development' and 'Relevant to my work', but the majority of learners selected 'Personal interest' (87.3 percent) and this was the highest option response recorded across all MOOCs. This level of personal interest does not sustain engagement throughout a course to complete engagement as demonstrated in data by Jordan (2014 and 2015).

5.3.2 Contribution to Knowledge – Theoretical

For a contribution to be theoretical, the findings from this thesis must provide analysis that would provide a logic to assist in the development of an engaging MOOC during the learning design process. Previous literature providing studies into MOOCs involved the analysis of data from a number of MOOC providers (Adamopoulos, 2013; Hew, 2015 Reich, 2014; Alraimi et al., 2015) and whilst providing insight they are absent of a consistent and therefore reliable single source of data. Using mixed sources of data can be beneficial to provide a range of understanding, but it can mask significant findings or anomalies that a single source can identify when analysed. The use of a single source of data provides a focussed theoretical contribution.

Whilst the literature provided a definition for learning design, it was absent of a definition of engagement with learning design. Though the source of this definition did not derive from academic literature in the context of engagement with learning design of MOOCs, the definition of 'the action of engaging or being engaged', with the use of the synonyms participation, participating, taking part, sharing, partaking, involvement and association, allow the application of this definition in terms of this context as a theoretical contribution. The analysis demonstrated that learners were engaging through participation in step visits, comments and likes. This confirmed participation in the course by visiting the steps and involvement, sharing and partaking through active engagement and active lurking through posting comments and likes.

The majority of literature found regarding engagement was in terms of formal classroom settings or on particular elements of learning design isolated for the purpose of research. This study provides a theoretical contribution through the systematic analysis of the learning designs as a whole of 19 MOOCs and subsequent engagement by learners in 76 presentations.

In light of the growing field of research regarding the significance of completion data in association with MOOCs and self-directed and autonomous learners, this study provides a new contribution to the literature. Through the analysis of 'Super Steps', the engagement of learners with the steps demonstrated that they selected the steps that most interested them (communication and assimilative) and they did not always follow the pattern of gradual decline with four Super Steps identified in Week 4 of courses in comparison to only one Super Step in Week 3 of a course. This finding is not replicated in the literature on engagement as focus has been given to the gradual decline of engagement over the weeks of the course, or to traditional classroom settings whereby learners must follow the linear lesson plans set by the educator. However, learners not completing the MOOC to the timescales expected by the educator did not have the same negative associations of dropping out, quitting or failing as it would with a traditional classroom setting. Learners in the Initial Study felt that they engaged to the point that their needs were met, and in some cases stated they had plans to return to the course as it was still available to them.

The final theoretical contribution of this study is in relation to the use of step titles within learning design. Of the literature reviewed the focus was on the content within the course and how the taxonomy subsequently was applied. However, the context of the use of step titles to engage learners with the content must be considered. From the findings of this study 25.81 percent of the Super Steps identified posed a question within the step title. This finding demonstrates that step titling is useful to increase engagement with a step, and that integration of step titling within learning design must be considered moving forward. When applying a Chi Square Test to these findings $p < 0.0001$ so therefore these findings are significant.

5.4 Future Research

As identified in Section 1.9 within the definition hypothesis and in Section 5.1 on the limitations of the study, this research worked to address one of the four proposed elements of optimum engagement within a MOOC. It is evident that to test this definition hypothesis fully the other three elements of the theory would need to be individually researched and collectively reviewed to test whether the definition hypothesis is reliable as a whole. This thesis forms the beginning of work on this definition hypothesis towards a definition of engagement.

The 120,842 survey responses used in answering the first research question can be reviewed to collate the data required to identify the population that undertake MOOCs and whether this varies from subject to subject. The survey has captured data on age, location, gender and previous academic study to give an understanding as to the type of learner that is interested in engaging with MOOCs as a longitudinal study that far exceeds current literature. This data can then be cross-tabulated with the survey question isolated for this thesis to identify the demographic of learners that undertake MOOCs for personal interest, professional study, to aid academic learning, etc. This would demonstrate the different demographics within the large heterogeneous population and how this may be possibly connected to the reasons as to why they engage with MOOCs.

The third element relating to the definition hypothesis is presentation. As Senior Producer: MOOCs at the OU, it is within my influence to change how and when the MOOCs are presented on FutureLearn. For example, the presentation of finance-related MOOCs to coincide with New Year's resolutions could increase engagement due to external factors. Therefore, it is possible for me to change how often and when the MOOCs are presented. In addition the MOOCs being syndicated to OpenLearn are available perpetually with no start and end date, so research over time, as and when the courses are syndicated, could potentially review how the same course is engaged with on timed and perpetual presentation cycles. The variance in this of course is that the platform and population differ from OpenLearn to FutureLearn, but the MOOCs that are syndicated to OpenLearn are

syndicated with the same survey as that of FutureLearn. This would allow for a comparison study of two platforms that differ in population, platform and presentation but have the same pedagogy to demonstrate how these three factors can influence how the course is engaged with.

The final element of the definition hypothesis is that of platform. Due to the FutureLearn platform undergoing a rapid build and continuous development it was not possible to factor analysis of the platform into this thesis. However, the platform is now reaching a point of stabilisation, so a review of the platform could now be conducted as part of the research to the definition hypothesis. Similarly a review could be conducted as to the OpenLearn platform which too has recently undergone rapid redevelopment.

Further research could be conducted into the learning design engagement survey that received 1,800 responses as part of this study. Within the survey there are responses as to the priorities learners have in addition to undertaking MOOC study such as social, family and professional commitments. Unlike a number of surveys and much literature reviewed as part of this research, the response of 'time' was not given as an option. This was purposeful in the fact that social, family, professional commitments, etc. all require time, placing emphasis on the currency of the learners' time against the value of the activities that they wish to undertake. For example, learners may factor familial activities above that of MOOC study if the MOOCs are not deemed valuable enough. The research then becomes how to make the MOOCs more valuable through more appropriate content and subject matter covered, external professional endorsement and academic accreditation, and to offer shorter courses to make them more manageable in a 'pick and mix empty course' strategy, or perpetually available instead of on timed presentations.

Finally, planned future research is to expand the review of MOOCs that have been produced by the OU. At the time of writing, the OU had produced 48 MOOCs, most recently with 12 of them being for academic credit at both undergraduate and postgraduate level. It may be possible to test the definition hypothesis by collectively reviewing the MOOCs and splitting the findings into three types

of pedagogy: non-endorsed courses, professionally externally endorsed course and academically accredited courses. Though the platform and presentation would remain the same in this context, the population and the type of pedagogy being produced would change. It may be possible to demonstrate that in the case of academic credit being available there is a difference in the population undertaking the MOOCs potentially leading to an increase in engagement.

5.5 Concluding Statement and Personal Reflections

Undertaking this research has been an eventful journey to say the least. My supervisors have been excellent in supporting me through these last three years and the rollercoaster of emotions that doctoral study brings. Doug Clow and Stephanie Lay have also helped me understand statistical calculations I hadn't used previously so I could analyse my findings further. These past few years have been challenging in respect of the ever-shifting sands of MOOCS, from platform development to the high volume of literature being rapidly released as this had become an academic focus for many, to the endless review of literature in the context of engagement, struggling for the papers firstly to define what engagement was, and secondly to define it beyond a traditional classroom setting.

Within the role of Senior Producer: MOOCs at the OU, access to data was not an issue as it is for many researching in this field; in fact it was the opposite problem: too much data. Given that both my supervisors also research within this field there were many meetings when deciding, due to our collective knowledge of the data, which method, data sample, etc. would best address my research questions. What I have learnt from this is that no academic discussion is a wasted one. Each of these discussions aided in the development of this research in understanding what to include, what to disregard and why, and what to signpost as future postdoctoral research. It is very easy to look back and think 'If only I had known …. at the time, how much easier this research would have been', except this would not have developed my skills as a researcher and aided in evolving my judgement of data and methodology in exploring a number of different options before reaching the focus of my

thesis, and would not have generated further academic curiosity in ideas and research questions for future exploration.

Finally, on a personal note, I thank again my supervisors for supporting me not only in an academic context but also in a personal one. These last three years have been a massive growth in confidence for me having never studied at a traditional residential university, but instead conducting all my qualifications, including now my fifth, online and at distance with the OU. The methodology used by the OU is different to that of traditional residential universities and as all my peers had at some point studied at one, I felt a bit of an anomaly. My supervisors were great in the encouragement given to express myself academically and I have now published and am due to publish shortly a number of academic papers, blog posts, presentations and even a book chapter in my time as a doctorate student. I plan to continue with this post doctorate.

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Appendices

Appendix One: Telephone/Skype Interview Questions

The initial study shall comprise of two forms of data collection. Firstly the interviewing of a sample of informal learners to determine an understanding of the types and levels of motivations required to begin informal learning. Secondly the survey of a sample of informal learners to understand the requirements in navigation of informal learning designs of informal learning journeys to motivate learners to progress through informal learning.

Below outlines the motivation questions proposed for the interview. The data collection from these will help to guide the development of the survey.

Interview Questions

1) What free online courses are you currently studying or last studied?

   Rationale: Ice breaker question to find out the learning background of the interviewee. What they like to study, how often they study, etc.

2) Why do you study free online courses?

   Rationale: To find out why they study; personal enjoyment, professional interest, academic advancement, etc. Helps to categorise the type of learner the interviewee is.

3) Do you like to study free online courses that are intellectually challenging?

   Rationale: To find out if the learner likes to be challenged to stay in their comfort zone. Some learners may remain engaged with something that challenges them, others by something they feel comfortable with.

4) Do you like to study with other learners or on your own?

Rationale: To find out if the learner is engaged when learning in a community or prefers to learn by themselves. Some find learning communities engaging, others find them disengaging.

5) How do you manage your time to study?

   Rationale: To understand how a learner allocates study time. Whether it is planned out, or whether it is ad hoc.

6) Have you even been bored by a free online course, if so what did you do about it?

   Rationale: To find out whether the learner persevered with the course, even though they were bored/struggling with a course, or whether they dropped out.

7) What attracts you to a free online course?

   Rationale: The understanding of the initial engagement of the course, what it because it was a subject that interested them, was it the title, the content, the lead educator, it was topical, needed it for work, etc.

8) When studying one course, have you ever changed it before finishing it for another one?

   Rationale: Linked to question 6. To find out if a learner was struggling/bored with the current course, but still engaged to learn so selected a more suitable course than the one that they were initially learning.

9) Have you ever skipped sections of a course, or learnt it in a different order to how it is set out?

Rationale: To see if learners learn courses in a linear journey as mapped out in the learning design, or whether they cherry pick the best bits, change round the order etc. Which may have an impact on learning design elements.

10) Would you like to add anything to your interview answers?

Rationale: To give the interviewees an opportunity to add anything that they wish to cover in more detail, or add that wasn't covered by the questions. Important to ask in helping to map out the survey questions.

Appendix Two: Transcribed Excerpts From Interview Responses

	Interview Questions for FutureLearn Participants (See Appendix One for full set of questions)									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	Currently or last studied?	**Why study open online courses?**	**Studying if intellectually challenging?**	**Studying with others or on own?**	**Managing time to study?**	**Bored by an online course?**	**What attracts you to a course?**	**Ever changed for another course?**	**Skipped sections or learnt in order?**	**Anything else to add?**
FutureLearn Participants										
FL01	Hamlet on FutureLearn, previously Moons on FutureLearn	Something to do, can't study full time any more as 76. It's easier to study online than go to classrooms	To a certain extent yes, something not picked up when younger so wish to learn more	Tend to be on my own. Studied with OU form 1978 to 2011 and have learnt a lot with other students so now prefer on my own	Just make time where possible	Don't think have even been bored by a course, have selected the right courses. Learning is important so interested in lots of things but not fine art or music.	First course was Moons, attracted as was OU course. Don't always study to timescale outline. Going back to it when finished to finish reading through.	Do change between courses sometimes if get stuck and then skip parts, or will go back to it later. Don't normally write in the comments so don't feel like I'm missing out	Generally look at everything in the order, except spreadsheets which I skip.	*Nothing else added.*
FL04	The Mind is Flat, previously studied an	Free, online and because interesting to learn. Not	Yes, the main reason to study as don't want to	Study at irregular times and in fits and starts	Can find some time, it does vary per course,	First started Mind is Flat and found it boring in	Interested in science based subjects, and	No, have bailed out of a couple of courses but	No, normally follow it unless it says it is optional.	*Nothing else added.*

	MA	all appeal but certain ones do if area of interest	relearn stuff, want to develop mind to push it further and study more	so prefer to do it on my own as feedback and comments aren't always rewarding, and not really a discussion. Don't really contribute when behind.	so can do stages in the week and dip in and out. Prefer shorter videos. Study on an iPad as easier to dip in and out and go at own pace.	parts, if make the smallest mistake it doesn't work and becomes frustrating. Community Journalism wasn't inspiring. As learning is a personal interest if not interesting won't spend time on it.	history, or psychology as that is first degree. Geography also.	not pushed into another one. Had then taken a break, Never stopped then looked for another.	Happy to take their lead. Can be tempted but don't in case the content is linked.	
FL05	Last studied a web design course using Moodle	The courses aren't always available near me and can fit around work, Also cheaper than attending university.	Yes, it keeps it interesting, although in this case I just wanted to obtain the skills and add them to my CV.	I like a mix of both. When there are complex theories to learn like to interact with the teacher. When have a lot of information to take in, like to study on my own	Fitted it around my work and social life. Did what was required to learn the subject and pass the course.	Yes, I struggled on. There wasn't an easy or obvious mechanism for feedback.	Relevant skills that I need for my job or personal interest in the subject.	No.	I've probably skipped sections that weren't compulsory. I don't think I've learnt it in a different order.	Successful courses need to be supported by regular feedback and interaction with tutors. It encourages learners, makes them feel a part of the course.

FL08	Study courses on holidays, have done 8-10 courses over 18 months all on FutureLearn	Want to learn everything possible if can, like learning and continuing to learn	Yes, as it is the point of learning	There's usually a forum that is helpful but sometimes the discussions are chaotic so difficult to learn with others. Would prefer an online residential school.	Retired so have sometimes been overly ambitious selecting too many at the same time. Not worried about it, rather be over ambitious than under ambitious so would go back and do it again later.	Abandoned the course on branding as it wasn't the course I thought it was. There are certain aspects of the course that can be less interesting so sometimes skip parts.	That is difficult as interests are board, background in science and computers, but found courses on forensics interesting. Know I'm not interested in fine arts.	Normally try to finish the course if I can. Sometimes one stalls based on time pressure and keep the ones that interest me the most. Sometimes go back and finish it off.	No, always follow the course.	*Nothing else added.*
FL11	University of Leicester 'Technology Enhanced Learning' in November 2014.	Primary reason is to further my career by adding to my existing knowledge about a particular field, and secondary reason is out of interest.	Yes, as it questions your existing ways of thinking and it wouldn't be as fulfilling or valuable if the course was easy.	It depends, It like to work at my own pace, but group activities can be fun and also help to measure if you are at the same level as others.	I am fortunate that I have no dependents so I came home and studied around 1-2 hours around 4 days during the weekdays.	Yes, it was that boredom or rather frustration at activities not working as they should have done that meant I didn't complete the course.	Primarily to further my career	No.	No, I follow the sections as suggested as I feel they have been ordered in a specific way for a logical reason.	I think had I received some form of reward for completing the course then I would have completed it.
FL12	FutureLearn Ecosystems	Working full time and having a	Very much so. The whole point	Don't mind really. Due to work and	Sometimes with great difficulty. Try	Have been bored on occasion in	The most important thing in the	On one occasion yeas. It was	Yes. This was due to the fact on some	*Nothing else added.*

course	family it is impossible for me to engage in full time or on site education and online courses offer the flexibility to be able to study when I have time.	of studying for me is to learn new things or to widen knowledge that already have on a subject that I'm interested in or previously studied.	family commitments sometimes find it easier to study on my own. However, I do enjoy bouncing ideas off others in forums.	to allot a certain amount of time each week for study but not always possible to stick to a timetable.	the past, and if after persevering for a set length of time and not improved then call it a day and find something else more suitable	first instance is subject material. Second is the amount of time required to study the course. Thirdly is how it is delivered.	purely down to the fact that the material was not what I thought it was, and I didn't enjoy the subject.	courses I'd already covered some of the sections on other courses before, so due to limited time preferred to concentrate on the subjects I had little or no knowledge of.	

Interview Responses for OpenLearn Participants (See Appendix One for full set of questions)

	1	2	3	4	5	6	7	8	9	10
	Currently or last studied?	**Why study open online courses?**	**Studying if intellectually challenging?**	**Studying with others or on own?**	**Managing time to study?**	**Bored by an online course?**	**What attracts you to a course?**	**Ever changed for another course?**	**Skipped sections or learnt in order?**	**Anything else to add?**
OpenLearn Participants										
OL01	Moons and Obama's Foreign Policy	Work through catalogue and make a list of interesting courses,	Used to be in full time education, then had ill health, study to help with	Never thought about it. Have studied at work	Have to be disciplined to study; helps give structure to the day.	No, if a little dry or not holding interest, research about it	Anything that is new and don't know about. Always picking	No, it taking a course then it must be completed otherwise it	Not skipped, but if stuck will research elsewhere to make it more	*Nothing else added.*

		helps with concentration and memory	concentration to return to full time education	together with colleagues. But usually study on own. Like both.		elsewhere and come back to it	something new.	is a waste of time	interesting	
OL05	Conversational Spanish	More convenient and flexible around working lifestyle	Yes	Prefer to study on my own	I work to critical deadlines, if not critical then take more time	Yes, have persevered	Its syllabus and whether it adds value to my knowledge	No	Yes	*Nothing else added*
OL07	Moons and also two modules of an OU IT degree	Study out of interest, wanting to learn more from TV programmes	Yes, already have a degree in mathematics and professional qualifications	On my own, used to studying on my own	Very good time management skills, prioritising and listing. Life skills in organisation	One in IT that was very boring, but completed it as useful for work. Saw it through on countdown	The subject matter, have a list of courses would like to do when time becomes available	Never dropped out of a course. Always seen through, even if don't like it, as it may help elsewhere	Yes, move things around all the time. If parts are hard go away and make a note then go back to it later. May make more sense.	*Nothing else added.*
OL09	Last studied Moons, busy at work at present.	Out of interest, if don't know about a subject and have an underlying interest. Use it to refresh learning from academic	Yes. Always.	Both, if MOOCs like to learn on my own, but have enjoyed learning in classrooms in the past.	If have time to study, if don't have time don't study. Normally on evenings and weekends. If credit was given then would find	Once or twice when wasn't what was expecting so got bored and couldn't engage or complete it.	An interest in the topic or an interest in the university presenting the course. Sometimes study with the	No, quite often have more than one course on the go. So pick up and put down, Study a week or a module at a time in	Haven't learnt in a different order but do skip sections when asked to write an essay. Have written a thesis so don't feel the need	Some MOOCs are well written and presented, some are too long with too many sections. Need more consistency. Needs to be a discussion with universities on

		qualifications.			the time.		university I did my PhD in (Exeter)	parallel. If behind focus on one course to catch up, then return to pattern.	to do it.	consistency.
OL10	Last studied my PhD	Like Yale's free online lectures, especially by Stanley Fish, opportunity to listen to great thinkers	Intellectually challenging is an essential part of being a critical thinker	On my own	Study around my commitments	I just like to watch the lectures not the whole course	World-leading thinkers, critical intellectual content	No	Yes, not a rote learner	*Nothing else added*
OL11	German and introduction to basic maths	Like the flexibility that get online, can have ten minutes of reading or activities on a mixture of devices	Yes, definitely, but also like to study things that are less challenging but interesting in terms of subject, focus, or approach	Prefer to study on own. Not studying at regular intervals, so fit it in. Having to work directly with others makes this more difficult	Depends on what else is happening, really enjoy it but can take a back seat when have other priorities	No, have enjoyed them all.	The subject, the length and the mode of studying	No, although haven't completely finished every single course	Have skipped questions or content if have a good understanding of them already	Far prefer methods that have flexible start dates rather than fixed dates as more accommodating of the time had.

Appendix Three: Learning Design Engagement Survey

(Questions 20 and 21 isolated for the purpose of this research)

This questionnaire is being conducted as part of a doctorate research project reviewing the factors and impact on motivation in informal learning and how through research the design of the learning materials used could be developed to aid the learner through to completion.

The research is being carried out by Hannah Gore of The Open University (UK) as part of her Doctorate in Education research.

By answering the survey questions below, you are consenting to us using your anonymised data for research and dissemination purposes. All the answers you provide to the following questions will be held securely. The data protection policy complies with the UK's Data Protection Act (1988).

The survey should take around 10-15 minutes to complete. You can stop answering the survey at any time by closing your browser. At the end of the survey you will be asked if you would like to participate in further research. This is entirely optional.

Any information you provide will be stored securely and not released to any third party. It will not be possible to identify any individual from any published account of the results of this study. Completion of the questions in the survey that follows indicates that you have read and understood the above information and in doing so, consent to be part of this research. If you have questions regarding this study, you may contact by emailing: Hannah.Gore@open.ac.uk

Hannah Gore

Your participation is greatly valued.

Thank you

Hannah

20. What parts of a free open online course do you enjoy the most? (you can select more than one)

- Articles
- Discussions/Forums
- Quizzes
- Videos
- Contact with the Lead Educator
- Contact with Facilitators assisting the Lead Educator
- Interactives
- Learning Activities
- Peer Assessment (assessing each other's work)

21. What parts of a free open online course do you enjoy the least? (you can select more than one)

- Articles
- Discussions/Forums
- Quizzes
- Videos
- Contact with the Lead Educator
- Contact with Facilitators assisting the Lead Educator
- Interactives
- Learning Activities
- Peer Assessment (assessing each other's work)

Appendix Four: The Open University MOOC Survey Questions

This survey is being conducted in order to learn more about the people who have chosen to study this course. The aim is to provide a better experience for our learners and to use our findings to help others.

The survey should only take about 5 minutes to complete. For more information about how your answers will be used and stored, please take a look at our FAQs and Privacy Policy. You can exit the survey at any time using the button in the top right-hand corner of the screen.

During the survey, you will be asked if you would like to participate in further research. This is entirely optional.

Filling in and submitting the survey indicates that you have read and understood the information above, and that you consent to be part of this research. If you have questions regarding this study, you can contact us by email at feedback@futurelearn.com.

This survey uses Surveymonkey and any information you enter will be stored temporarily in the US. By taking part in the survey you are consenting to any information that can identify you as an individual being stored in this way.

Thank you for taking part, your participation is greatly valued.

1. Why are you interested in studying this course? (Please tick all that apply)
    - Personal interest
    - My professional development
    - Relevant to my work
    - Relevant to my studies
    - For the purpose of teaching others
    - For the purpose of sharing with others
    - Commercial interest
    - Relevant to voluntary work
    - To improve my English
    - To find out if I can study at this level
    - To find out more about The Open University
    - To find out more about FutureLearn
    - The course was free

- To try out learning online
- To learn more flexibly around my commitments

2. Have you taken a course delivered mostly or fully online before (including MOOCS)?
    - Yes
    - No
3. What sort of online course have you taken (Please tick all that apply)
    - An online course for continuing professional development (CPD) or work-related training
    - A massive open online course (MOOC) e.g. FutureLearn, Coursera, EDx
    - An online course for university credit
    - An online course based around open educational resources e.g. OpenLearn
    - Other (please specify)
4. How many hours a week do you expect to spend on this course? (The course description states that it will require X hours a week)
    - Less than 1 hour
    - 1-2 hours
    - 2-3 hours
    - 3-4 hours
    - 4-5 hours
    - More than 5 hours
    - Not sure
5. How many weeks do you expect to spend on this course? (The course runs for X weeks)
    - Less than 1 week
    - 1-2 weeks
    - 2-3 weeks
    - 3-4 weeks

- 4-5 weeks
- 5-6 weeks
- 6-7 weeks
- More than 7 weeks
- Not sure

6. Have you studied an open online course with any of these providers? (Please tick all that apply)
    - Coursera
    - edX
    - FutureLearn (other than this course)
    - Khan Academy
    - MIT OpenCourseWare
    - OpenLearn
    - Udacity
    - Not sure
    - Not of these
    - Other (please specify)
7. How did you find out about this Open University course? (Please tick all that apply)
    - Via FutureLearn
    - Via The Open University
    - I used a search engine, such as Google
    - I read about it online
    - I read about it in a newspaper/magazine
    - It was on the television/radio
    - I saw it on an educational website
    - I saw it on another educational institution's website

- It was recommended to me by a friend/colleague
- It was recommended by a teacher/tutor
- It was recommended by my employer
- I can't remember
- Other (please specify)

8. What is your gender?
    - Male
    - Female
    - Other
    - Prefer not to say
9. What is your age?
    - Under 16 years
    - 16-18 years
    - 19-25 years
    - 26-35 years
    - 36-45 years
    - 46-55 years
    - 56-65 years
    - Over 65 years
    - Prefer not to say
10. Which country do you live in?
11. What is your first spoken language?
12. What is your highest educational qualification?
    - No formal qualification
    - School-leaving qualification (16 years)
    - School-leaving qualification (18 years)

- Vocational qualification
- College diploma or certificate
- Undergraduate/Bachelors university degree
- Postgraduate/Graduate school university degree
- Doctorate
- Other (please specify)

13. What is your employment status?
    - Full time employed/self-employed
    - Part time employed/self employed
    - Full time voluntary work
    - Full time student
    - Part time student
    - Unwaged and seeking employment
    - Unwaged with domestic responsibilities
    - Disabled and not able to work
    - Retired
    - Prefer not to say
    - Other (please specify)
14. Do you consider yourself to have a disability?
    - Yes
    - No
15. If you answered yes to the question above, please indicate the nature of your disability

We'd like to record your email address, so that we can link your responses on this survey to your FutureLearn account and use them to make your learning experience even better. If you prefer to remain anonymous, please just leave this question blank.

16. What is your email address? (this should be the email address you used to sign up to FutureLearn)
17. Would you like to be part of a FutureLearn review group? This means we may use the email address you have provided in order to get in touch with you periodically to seek your reviews, opinions and feedback on specific topics.
    - Yes, I am happy to join a FutureLearn review group
    - No, I do not want to join a FutureLearn review group
18. The Open University, which is running this course, would like to contact a selection of survey respondents to take part in a research interview via email or telephone. The information provided will be kept confidential.
    - Yes, I would be happy to take part in an Open University research interview
    - No, I do not want to take part in an Open University research interview
19. Please share any other thoughts about your expectations of this course or of FutureLearn

Thank you very much for participating in our research. If you have any questions about this survey or the research interviews, please contact openlearn@open.ac.uk

For office use only:

HREC reference no.:	
Date a response is required from the reviewer:	

HUMAN RESEARCH ETHICS COMMITTEE (HREC) PROFORMA

Open University research involving human participants or materials has to be reviewed and where appropriate, approved by the HREC. To apply to HREC, please complete and email this proforma to research-rec-review@open.ac.uk. You will need to attach any related documents such as a consent form or information sheet so that a full application can be considered by the HREC Review Panel. Omitting any documents may result in a delay to the review process.

If you have any queries about completing the proforma please look at the Research Ethics website, in particular the FAQs - http://www.open.ac.uk/research/ethics/human-FAQs.shtml which include a set of Generic Protocols and Templates. You can also contact the HREC Chair or Secretary.

The submission deadline for applications is **every Thursday** at **5.30pm** when they will be assessed for completeness and then sent to the HREC Review Panel. Once an application has been passed for review you should receive a response within 10 working days.

All general research ethics queries should be sent to Research-Ethics@open.ac.uk, or call the **HREC Secretary** on ☎ **01908 654858**.

Please complete all the sections below – deleting the inserted instructions.

Project identification and rationale

Title of project

Abstract

Project personnel and collaborators

Investigators

Give names and institutional attachments of all persons involved in the collection and handling of individual data and name one person as Principal Investigator (PI). Research students should

name themselves as Principal Investigator and it is a requirement that a separate supervisor endorsement is sent to Research-Rec-Review@open.ac.uk to support the application. The endorsement needs to be received with the application or shortly after, as the application cannot be processed without it. Please include the relevant HREC reference number if possible (see note for supervisors).

Principal Investigator/
(or Research Student): _____

Other researcher(s): _____

Primary Supervisor (if applicable): _____

Research protocol

Literature review

Methodology

Outline the method(s) that will be employed to collect and analyse data. Any related relevant documents, such as interview or survey questions should be sent with the completed proforma. If for any reason this is not possible please contact the HREC Secretary (research-rec-review@open.ac.uk.

Participants

Give details of the population targeted or from which you will be sampling and how this sampling will be done. Give information on the diversity of the sample.

Recruitment procedures

Give details of how potential participants will be identified and approached.

Consent

Give details of how valid consent will be sought and attach copies of information sheet(s) and consent form(s), as applicable. Give details and a timeframe of how participants can withdraw consent and what will happen to their data in such a case (see FAQ number 14 on the Research Ethics website for a guidance document and templates).

Location(s) of data collection

Give details of where and when data will be collected. If on private, corporate or institutional premises, indicate what approvals are gained/required.

Explain why the research needs to be conducted in the chosen setting or location.

Schedule

Time frame for the research and its data collection phase(s).

Key Ethics considerations

Published ethics and legal guidelines to be followed

Detail which guidelines will be followed by the researchers.

For example: BERA, BPS, BSA, SRA, MRS, SPA, UK Evaluation Society (see FAQ number 5 on the Research Ethics website for more information).

Data Protection

Give details of the project registration under the DP Act and the procedures and schedule (including dates) to be followed re: storage and disposal of data to comply with the Act. Any requirements by the funding body should also be given. Please note the OU guidance via the FAQ number 7 and OU information security guidance.
Indicate the earliest and latest date for the destruction of original data if that is required – or any

archiving arrangements that have been agreed/permitted/required. Ensure this is also indicated in the project schedule.

Recompense to participants

Normally, recompense is only given for expenses and inconvenience, otherwise it might be seen as coercion/inducement to participate. Give details of any recompense to participants.

Deception

Give details of the withholding of any information from participants, or misrepresentation or other deception that is an integral part of the research. Any such deception should be fully justified.

Risk of harm to participants

Detail any foreseen risks to participants or researchers (e.g. home visits) and, based on a risk assessment, the steps that will be taken to minimise/counter these (a risk assessment matrix is available at FAQ number 15). If the proposed study involves contact with children or other vulnerable groups, please confirm that the requirements of the Vetting and Barring scheme provided by the Independent Safeguarding Authority (ISA) for each person involved in these contacts have been complied with (FAQ number 10).

Debriefing

Give details of how information will be given to participants after data collection to inform them of the outcomes of their participation and the research more broadly.

Project Management

Research organisation and Funding

Please provide details of the principal funding body (internal or external). If your project is part of a current or successful externally funded bid, enter your RED Form reference number below. For further guidance contact your Faculty Research Administrator (FRA) or refer to the Research Grants and Contracts website.

Red Form Ref No.: _____

Other project-related risks

Indicate how research risks are to be limited by anticipating potential problems. If appropriate, please refer to the insurance cover provided by the Open University (FAQ number 13).

Benefits and knowledge transfer

State how the research may be of general benefit to participants and society in general (100 words maximum).

Declaration

I declare that the research will conform to the above protocol and that any significant changes or new ethics issues will be raised with the HREC before they are implemented.

I declare that I have read and will adhere to the following two OU documents:

- OU Code Of Practice For Research and at the Open University
- OU Ethics Principles for Research involving Human Participants

http://www.open.ac.uk/research/ethics/index.shtml)

In order to conform with OU governance guidelines, brief information on OU research **approved** by the HREC will be added to the Research Ethics website. The HREC will assume that you agree that the following data from your research can be made public via the website unless you tick the box below:

HREC reference number	Project title	Faculty	Approval date	Type of HREC approval

☐ No, I do not wish for details of my HREC approved research to be publicised.

Name: _____

Unit/Faculty: _____

Telephone _____

E-mail _____

Signature(s)
(this can be the typed name(s) of investigator(s) if an electronic copy is submitted (which is preferred) _____

Date: _____

End of project final report

Once your research has been completed you will need to complete and submit a final report to the HREC. A copy of the template can be found on the Research Ethics website at http://www.open.ac.uk/research/ethics/human.shtml#Final_report.

Proposed date for final report: _____

Office Use Only – Vr7 – 03/12/2012	
Application No:	
Date received:	
Pending:	
Approved/Not approved	

The Open University

Student Research Project Panel Application Form

Student Researchers

Please note that:

- An application must be submitted and approved before the start of the proposed research
- The dates of the working group meetings and deadlines for applications are available on the SRPP website http://iet-intranet.open.ac.uk/research/index.cfm?id=7082

For submission and further help please contact: IET-SRPP@open.ac.uk

Section One: Applicant Details

1. Applicant Details:

Name:			
Email:		**Telephone:**	
Faculty/Unit:			
Name: OU Academic Supervisor			
Email: Supervisor (**if** your supervisor is external to the OU, provide details of your internal supervisor too)			

2. Research details:

Title of Research:	Effective Processes and Structures in Online Learning through a Social Paradigm
Target Start Date: (i.e. **first day** you want to **initiate contact** with participants):	(**Estimate date** if you do not have a definite date for sending the invitation)
Target End Date (i.e. survey, interviews, focus group):	

3. Consultation with other OU staff about the research.
Please indicate whether the research involves the following and whom you have contacted. If your research involves specific modules we would expect you to have discussed the research with the module team.

Unit:	**Contact name:**
Faculty Associate Dean or Module Team	
Marketing	
Student Services – Regions	
Student Services – other areas	
IET Student Statistics and Survey Team	
Other (please specify)	

Section Two: About your research

4. Brief aims of the research:

5. Please give a brief description of your methodology (maximum 250 words):

6. Research Theme: Students agree to be contacted (Conditions of Registration) in order to help the University 'plan and improve our services'. Explain how your research meets this criterion:

7. Is there any overlap with any previous or current research? (Please tick)

☐ Yes ☐ No

If yes, please explain.

8. Will this research be repeated? (Please tick)

☐ Yes ☐ No

If yes, how often?

9. Data collection methods - please indicate your proposed research method(s):
(Please tick all that apply)

☐ Paper	☐ Focus Group
☐ Online	☐ Other
☐ Telephone	Please specify other: Observational trial as to how a leaner may navigate an informal learning journey
☐ Personal interview	

10. Please explain how the research will be disseminated internally to OU researchers and staff and detail any plans for external publication/dissemination of your findings:

Section Three: Sample

Samples are usually drawn by the Student Survey and Statistics Team (SSST). Once you have specified the criteria the SSST and SRPP will check that the criteria are within university guidelines. Samples are drawn using information from the CIRCE database. If you want to draw your own sample you **must** send it to the SSST to be checked **before** it is used. We have developed a template to help you: PI Check .

If you need advice about specifying the sample please contact us via the IET-SRPP mailbox in the first instance – IET-SRPP@open.ac.uk.

The request to your sample students to participate in the research needs to come from your internal supervisor; this is to satisfy data protection regulations. If students choose to respond to the invitation to participate they should be informed that their response and any follow up will be analysed by you, as part of your Open University studies.

To provide you with the most appropriate sample please consider and specify the following:

- For module specific samples please specify the module, year and presentation codes.
- For general and module specific samples of the OU population these are some extra fields (data held on CIRCE) that you can request – please check this document for further information: Demographics

For module specific samples please use this box:

Module/s e.g. AA100	**Presentation/s** e.g. 2010J	**Sample Number requested** e.g. 300	**Aimed for response rate** e.g.150 or 50%
Other specifications e.g. type of contact details; previous educational qualifications.			

For all other samples please complete this box:

Sample specification e.g. Random sample level 1 modules	**Sample number requested** e.g. 300	**Aimed for response rate.** e.g. 150 or 50%
Other specifications, e.g. type of contact details; previous educational qualifications.		

Section Four: Format Design and processing

This section **is only** necessary if you need the SSST to help administer your survey.

Please contact Jane Wilson for information about services the Survey Office charge for and the timescales involved.

When will the final questions be supplied to the SSST Office? ☐

Survey Type: Postal ☐ Online ☐ Both ☐

Survey Mailing:

Target mailing date: ☐

Reminder required: **Yes:** ☐ **No:** ☐

Close of Survey date: ☐

Is the **close** of survey date approximate or definite? **Approx:** ☐ **Definite:** ☐

Data Processing:

Data from online and paper questionnaires can be returned as SAS, Excel or SPSS files. Reports are normally produced to a standard format. Please contact iet-surveys@open.ac.uk if you require further information OR additional analysis.

If you have open comments (paper questionnaire) and you need them to be typed please ask Jane Wilson if the SSST can help with this.

Finance:

Please contact Jane Wilson for information on cost of survey service.

Please indicate funding arrangements:

Baseline: ☐ **Internal:** ☐ **External:** ☐

Baseline = payment will be made in advance of work being carried out
Internal = payment will be made by an OU Department
External = funded by research grant

Section Five: Supporting Documentation

Documentation

Please do not forget to attach the required supporting documentation with your application. Indicate below which items of supporting documentation you have sent as attachments with this Application:

☐ Copy of survey instrument/s (draft questions for interviews, copy survey, focus group details etc)	☐ Note/email from Supervisor supporting this research and sample request
☐ Copy of covering letter/s or invitation	☐ Copy of consent form (if applicable)

☐ I can confirm that a Data Protection Questionnaire has been submitted to the University's Planning Officer (Legislation and Information) – Data-Protection@open.ac.uk

In line with best practise brief details of this research proposal once it is approved will be published on the SRPP Intranet page (including the name of the lead researcher):

http://intranet6.open.ac.uk/mgt-info/iet-stats/srpp/further-information

Please submit to: IET-SRPP@open.ac.uk (Please remember to 'save' the form first to attach to email)

Office Use Only	
Application No:	
Date received:	
Approved/Not approved	

The Open University

Application to research and release data on The OU's open educational resources

Please note that:

- An application must be submitted and approved before the start of the proposed research.
- The OMU will endeavour to respond within 4 weeks of receipt of application.
- Prior consultation with The Open Media Unit is advised before filling in this form and submitting your application. For guidance on releasing data about the OU's open and free educational resources please see The OMU intranet pages.
- 'Open data' refers to research and analysis of the use of assets created or shared by the University that carry a Creative Commons licence, and assets created by The University freely to view that do not carry a Creative Commons licence i.e. they are released on open platforms, such as FutureLearn, but carry their own restrictions.
- Raw data and research findings should be shared with the Director, OMU where requested.

For submission and further help please contact: andrew.law@open.ac.uk

Section One: Applicant details

1. Applicant details

Name:		**Faculty/Unit**	OMU
Telephone:		**Commissioning Faculty/Unit if applicable:**	
Email:			

2. Research details

Title of Research:	
Target Start Date (survey/data analysis):	
Target End Date (as above):	

3. Other research personnel

Please give details of all staff within the research team directly involved in this research work – don't forget if you are an AL you will require a sponsor.

Name:	**Faculty/Unit/Agency/Sponsor/Principal Investigator:**

4. Consultation with other OU staff over research

Unit:	Contact name:
Faculty Associate Dean or Module Team	
Other (please specify)	

Section Two: About your research

5. Brief aims of the research

6. Please give a brief description of your methodology and any existing open data held by The Open Media Unit that you require access to

7. Do you consider this to be quality assurance (QA) work?

☐ Yes	☐ No

8. Is there any overlap with any previous or current research?

☐ Yes	☐ No

If yes, please explain

9. Data collection methods - please indicate your proposed research method(s)
(Please tick all that apply)

☐ Paper	☐ Focus Group
☐ Online	☐ Other
☐ Telephone	Please specify other:
☐ Personal interview	

10. Please explain how the research will be disseminated internally to OU researchers and staff and detail any plans for external publication/dissemination of your findings:

Please indicate funding arrangements:

Baseline: ☐ **Internal:** ☐ **External:** ☐

Baseline = payment will be made in advance of work being carried out
Internal = payment will be made by an OU Department
External = funded by research grant

11. If your work is funded externally, please provide details of any existing agreements with funders for the gathering and/or release of open data:

Section Three: Supporting Documentation

Please do not forget to attach the required supporting documentation with your application. Indicate below which items of supporting documentation you have sent as attachments with this Application:

☐ Copy of research instrument/s (draft questions for interviews etc.)	☐ Note/email from Sponsor (if applicable)
☐ Copy of covering letter/s or invitation	☐ Copy of agreement with external funder

☐ I can confirm that a Data Protection Questionnaire has been submitted to the University's Data Protection Co-ordinator. Email: ***Data-Protection@open.ac.uk***

Please submit to andrew.law@open.ac.uk

Appendix Eight: Platform Glossary of Terms

The table below provides a summary of the variances in features between the Open University platforms described above:

Feature	OpenLearn	FutureLearn	SocialLearn
Year of Launch	2008 -	2013 -	2008-2013
Course Type	OER Open Course	MOOC	Remixed OER
Course Length	1-24 hours/8 weeks	12-24 hours/8 weeks	Not set
Summative Assessment	No	Yes	Possible
Formative Assessment	Yes	Yes	Possible
Forums/Discussions	No	Yes	Yes
Facilitators	No	Yes	Yes
Lead Educator	No	Yes	No
Synchronous	No	Yes	No
Learning Pace	Self-Directed	Set Pace	Self-Directed
Presentations	Perpetual Cycle	2	Perpetual Cycle
Certification	Yes	Yes	No
Digital Badge	Yes	No	No